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Railway & Commercial Gazette

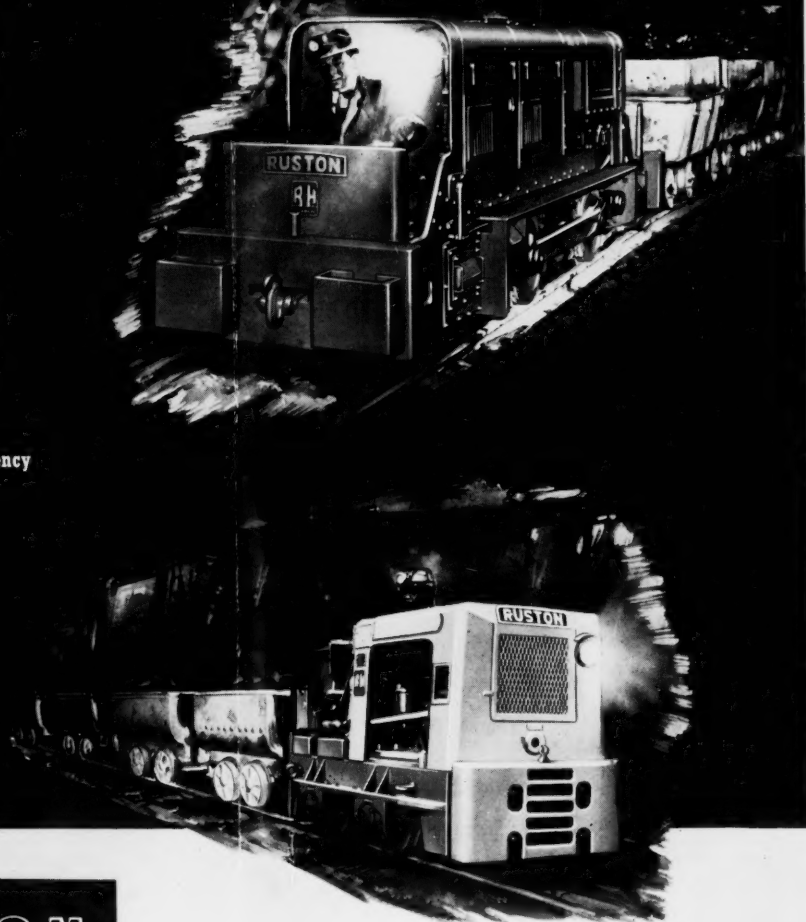
Vol. CCXLIII No. 6202

LONDON, JULY 2, 1954

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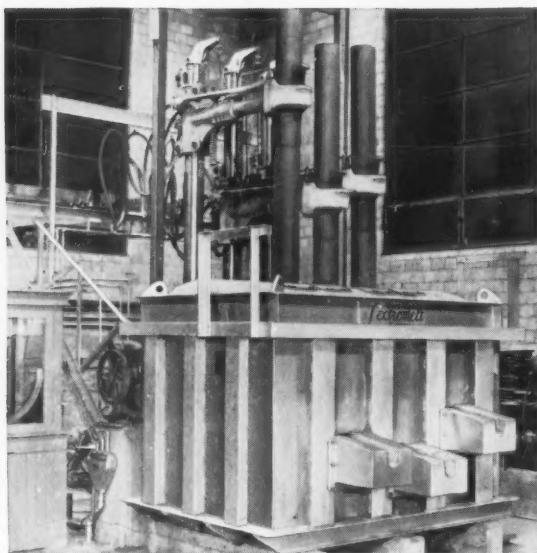
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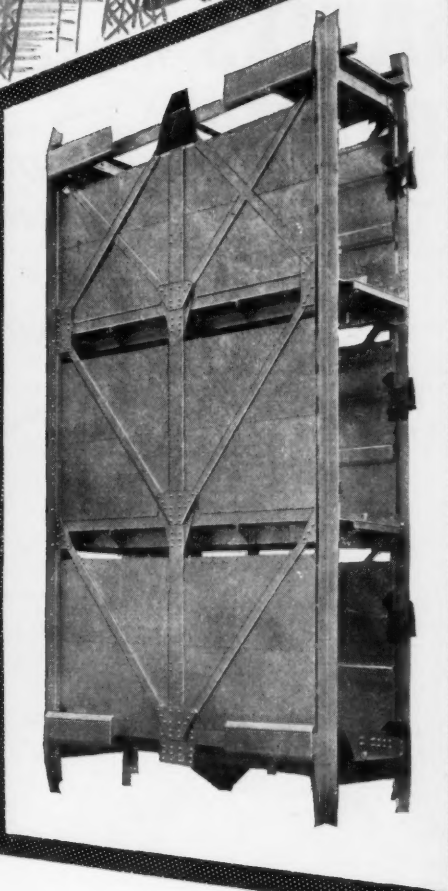
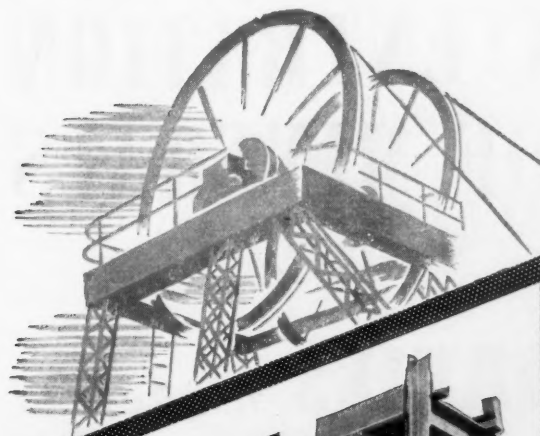
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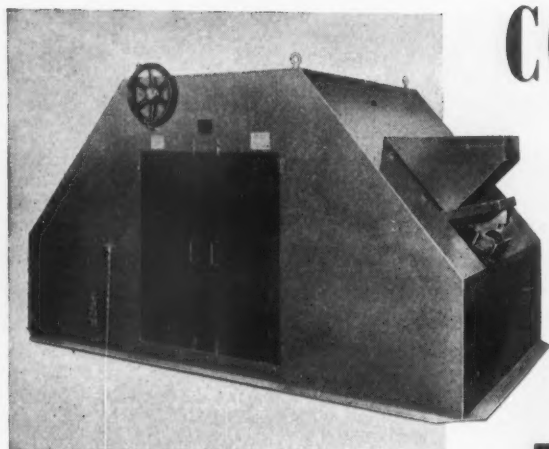
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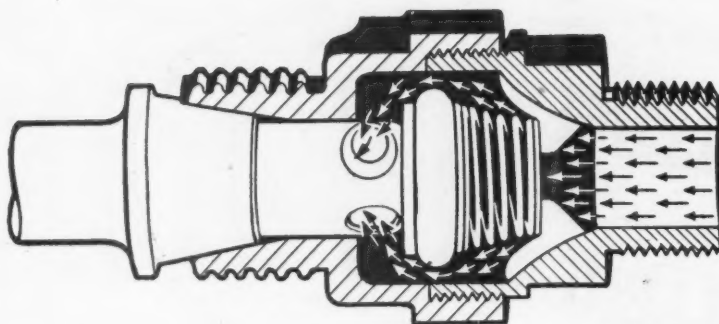
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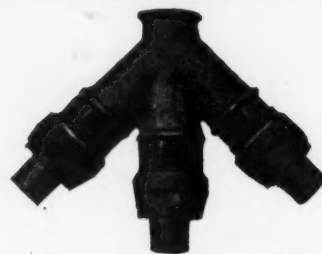
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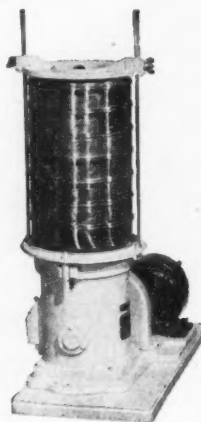
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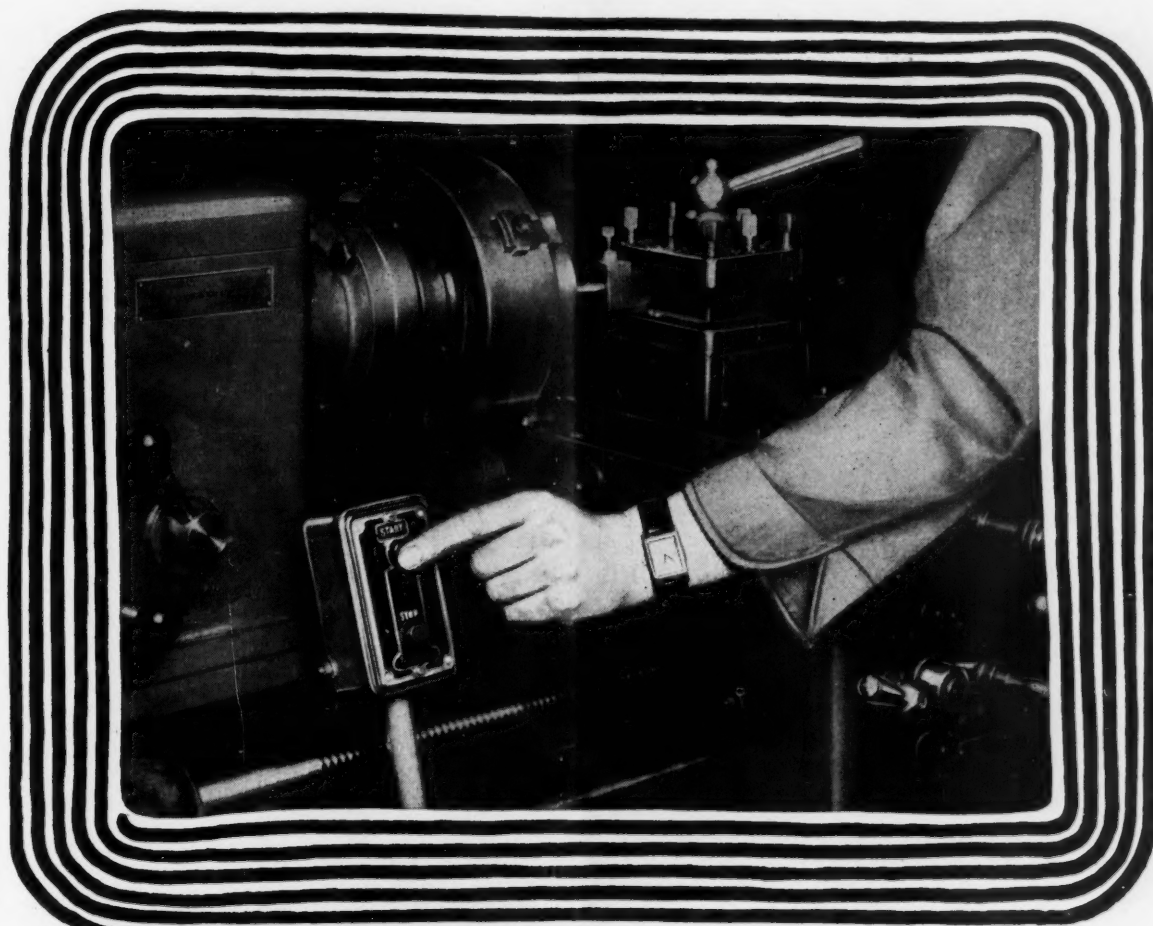
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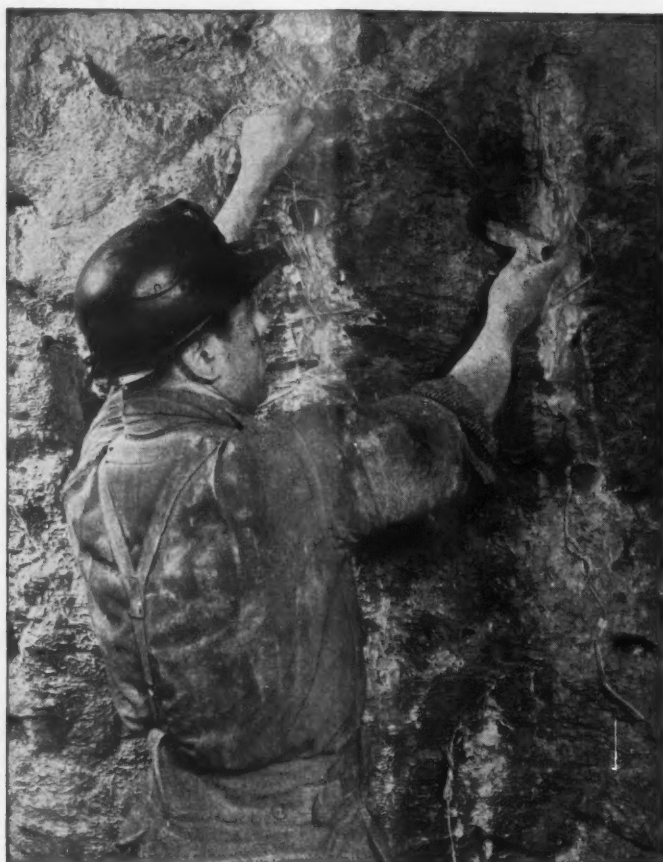
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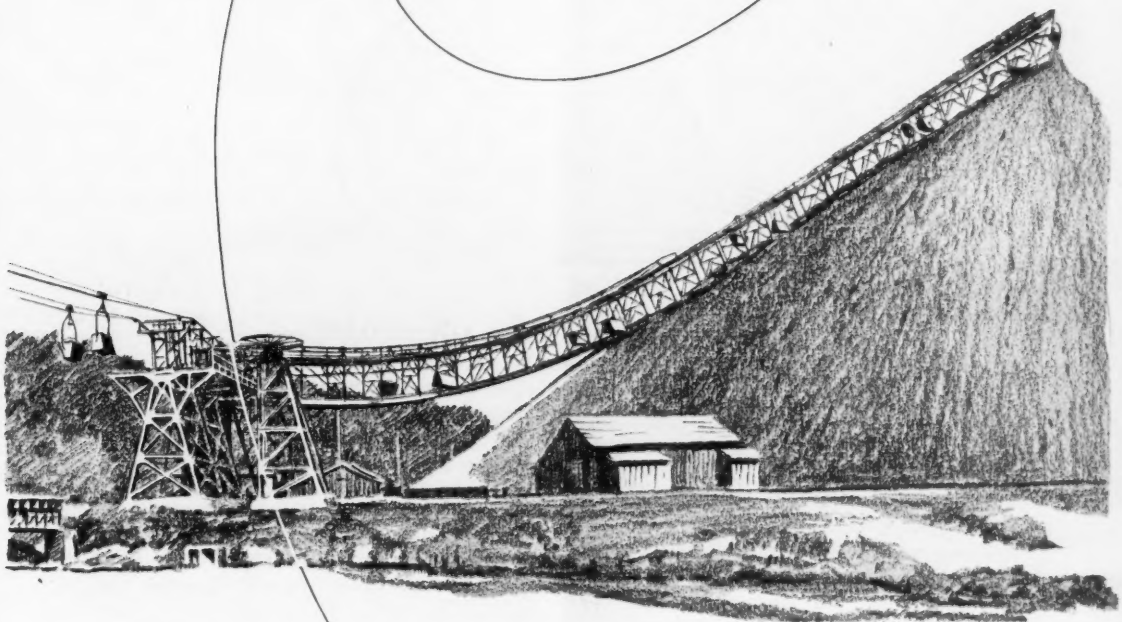
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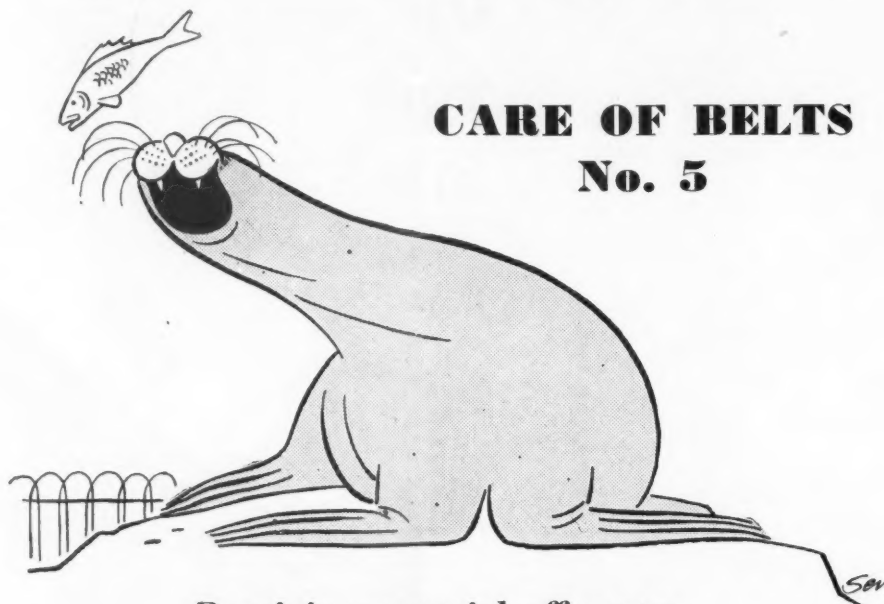
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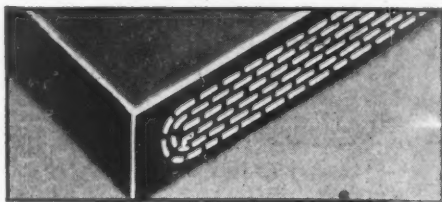
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The Mining Journal

Established 1835

Vol. CCXLIII No. 6202

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CONTENTS

Notes and Comments	9	The Mining Markets	20
From Our Western United States Correspondent	11	Company News and Views	21
Water Base Drilling Mud	12	Company Shorts	22
The Beneficiation of Tungsten Ores	14	Company Meetings	24
The Canadian Asbestos Industry in 1953	15	Union Minière du Haut-Katanga; Killinghall Tin Limited; Siamese Tin Syndicate Limited; Tekka-Taiping Limited.	
Machinery and Equipment	17		
Metals, Minerals and Alloys	18		

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NOTES AND COMMENTS

The American Protectionists' Dilemma

The contents have now been made public of the report of the Malone Committee appointed by the U.S. Senate, to determine the "accessibility of critical raw materials in time of war and to recommend a new policy of buying of metals and minerals for the U.S. stockpile." From the summaries of the report which have so far reached this country it appears in the event to be a most regrettable document and to contain all the protectionist and isolationist proposals forecast in the leading note of our issue of February 5, page 149.

Briefly, the Committee's proposals are based upon and recommend a policy of mineral self sufficiency for the Western Hemisphere. Stemming from this it recommends the restoration to Congress of the powers now delegated to the President to enter into trade agreements and to raise or lower tariffs. It also recommends the continued operation of the Government's Texas smelter, together with increased depletion allowances. Finally, the Committee urges the acceleration and co-ordination of stockpile purchases designed to stimulate and sustain mining in the Western Hemisphere. At the same time, the strategic purchase of materials in the Eastern Hemisphere should, according to the report, be halted.

The Malone Report, of course, reflects to a considerable extent the domestic mining interest, as might be expected from a sub-committee of the Senate's Insular Affairs Committee, and it is clear that, if this group in Washington had its way, the affairs of American industry would soon become very insular indeed. Fortunately the White House has recourse to other sources of advice besides this and the general view in Washington at the moment seems to be that with a year's extension to the Reciprocal Trades Agreement Act now assured the practical effect of the Malone Report on U.S. foreign trade policy is likely to be nil this year, although it will no doubt be called in aid by its supporters when foreign trade policy comes up for discussion in Congress next January.

It is characteristic of the American system of Government, which divorces the executive from the legislature, that any major vested interest can usually contrive to publicize its viewpoint through the medium of some Congressional enquiry which, to the uninitiated, may appear

to endow that viewpoint with greater authority and influence than it will, in fact, exercise. The indications are that such will prove to be the case in the present instance. Nevertheless, the recommendations are on record from a responsible Senate Committee and consequently must be accepted and answered as such.

The inherent weakness of the American protectionist case for the metals is evidenced by the fact that even its supporters have had to depart from the position that the United States can supply her own mineral needs, and have substituted for it the primarily strategic concept of Western Hemisphere self-sufficiency, which, in effect, boils down to the argument that an ore carrier from Chile or Jamaica stands a better chance of making port in the States during war than does one from Malaya or West Africa.

Leaving aside for the moment its economic implications this concept appears to suffer from two major strategic misconceptions. In the first place the atomic age has presumably placed the world beyond the era of the long drawn out major war. When Mr. Churchill said in Washington this week that in a future war the Western Powers would emerge victorious upon a heap of ruins, he might well have added "and in a very few months too." In a short war the only strategic mineral reserves of any significance are likely to be mined and stockpiled concentrates or metal, a factor which is presumably inherent in the present American stockpiling policies. It follows that the military significance of the mining industry lies in the volume of output of strategic materials which can be produced before the shooting starts. Consequently, the importance of shipping, in this context only, becomes much reduced.

The second misconception is based quite simply on the fact that Western Hemisphere self-sufficiency for a considerable range of metals is, on the basis of present geological knowledge and American industrial activity, just not practical. Offhand the following metals and minerals come to mind as ones of which the Western Hemisphere is a substantial net importer: tin, columbite, manganese, chrome, tungsten, beryllium, diamonds, graphite, uranium and cobalt. There are certainly others. It may well be that the position for some of these metals may become modified in time. Thus, for example, there appears to be the possibility that half the U.S. steel industry's manganese

requirements may eventually be recovered from open-hearth slag; but speaking as at the date of the Malone Report anything like total mineral self-sufficiency just isn't on.

Leaving aside the strategic considerations and looking at the Malone recommendations in an economic context, artificially induced self-sufficiency must mean two things. Firstly, it must mean artificially high cost domestic production brought about by price support programmes, bulk purchasing, inequitable tax reliefs, high tariffs, and other devices, which will all have the effect of stimulating production from sub-marginal mines and raising the domestic price of the metal to American industry.

By way of an indication of where this kind of thing can lead to, it has been estimated in Washington that a 2 c. increase in the price per lb. on the basic metals used in American industry would add about \$2,500,000,000 to the nation's annual expenditure on these materials. America's economic supremacy has, we are always told, been built up on freely competitive buying and selling. Just how long the health of American industry can remain unimpaired with feather bedding on this scale is a matter on which the members of the Malone Committee might usefully reflect.

Not only is a policy of American mineral self-sufficiency thus a direct threat to the American standard of living, but it makes economic nonsense of the foreign policies aimed at the development of backward areas with which the present Administration is presumably still identified.

This is all very sad. Let us hope that the Malone Report will never find favour at the White House, otherwise it will all be very serious as well.

Iron and Steel Research

There are a number of interesting items in the recently published Annual Report for 1953 of the British Iron and Steel Research Association.

An important event last year was the arrival in Britain of the first shipments of iron ore from the newly developed field at Conakry, West Africa. Shipments of ore from the Labrador-Quebec developments will probably begin towards the end of 1954. An indication of the problems involved in the development and utilization of new sources of ore is afforded by the B.I.S.R.A. Annual Report. At the instigation of B.I.S.C. (Ore) Ltd. and the British Iron and Steel Federation B.I.S.R.A. studied the technical possibilities of Conakry ore for large scale use. The deposit consists of a hard top layer (Bed A) up to 13 metres thick. Recent working of this bed has enabled the ill-defined intermediate layer (Bed B) and the soft bottom zone (Bed C) to be more fully examined. Samples from cargoes have been tested both in the laboratory and in full-scale trials. Bed A is suitable for the blast furnace without further processing. Beds B and C require agglomerating, and a preliminary survey of the utilization of this material has been made.

When mined, Conakry ore, Bed C, contains 30 per cent free and 12 per cent combined moisture; on drying, the fine grain size makes it difficult to handle. Drum pelletizing, using dry ore plus water, was found to be promising. The critical temperature for firing proved to be 1,300 deg. C., which gave a crushing strength of 500 lb./sq. in. Methods of briquetting were investigated, using coke in the mixture to give partial reduction in firing. Optimum conditions were obtained with plus 10 mesh ore and 5 per cent coke, fired to about 1,200 deg. C.

Arising from B.I.S.R.A.'s work on imported ore handling, general recommendations for improving the efficiency of the shipping, discharging and subsequent land transportation of ore have been made to the British Iron and Steel Federation. It has been concluded that the construction of special ore carriers will be an economical means of

obtaining much of the increased shipping capacity needed for future imports. It is desirable to build the largest ore carriers that can be accepted at the ports which are to be served, because for large vessels, the capital and operating costs per ton of capacity are lower than for small vessels. In regard to ports and unloading equipment, the first need is to ensure the provision of fast, continuously-manned unloading machines on fewer berths, so that a higher rate of discharge of ore can be obtained. The introduction of new equipment and methods of operation will be likely to raise certain problems, and it will be necessary to obtain the full co-operation of the dock workers to overcome them.

Interesting possibilities are presented by a process developed by B.I.S.R.A. for the hot dip coating of steel with pure aluminium and aluminium-silicon alloys. Laboratory work on sheet samples was followed by the small-scale batch aluminizing of fabricated articles. These experiments suggested that good results could be obtained and that the process should not be too difficult to operate. In view of the advantages of continuous processing, a small pilot plant, suitable for the continuous aluminizing of strip up to 2 in. wide, was erected at Swansea, the main objective being to reduce the process to the simplest form consistent with satisfactory coating.

The appearance of the coatings produced by both the batch and continuous processes is bright and attractive. Particularly noteworthy is the heat resistance of aluminized articles at all temperatures up to 700 deg. C. Considerable protection to the steel base was afforded even when aluminized articles were heated to this temperature for more than 2,000 hours. The economic value of this method of protection can only be determined by laying down full-scale plant, but the potentialities seem large enough to merit very careful investigation.

Exploration for Oil in Australia

Interest in the possibilities of economic oil deposits in Western Australia was touched off by the discovery at Exmouth Gulf which was reported in *The Mining Journal* of February 12, 1954. Preparations for exploration by new companies continues actively, and much geological and geophysical work is in progress, writes our Australian correspondent.

In most cases the provision of nominal capital and initial subscribed capital should ensure efficient exploration, and the advent from U.S.A., or formation in Australia, of drilling organizations, promises an adequate supply of suitable drilling equipment and capable personnel. The Rough Range No. 1 well of West Australian Petroleum Pty. Ltd. has reached a depth of 9,226 ft. with no change of significance, following the location of oil at 3,605 ft. The company proposes to spend £A20,000,000 in the next three years. Mobile drills are being imported and the company expects to be producing oil before the end of the year, to which end, work is proceeding for provision of shipping facilities at Exmouth Gulf. West Australian Petroleum is also about to commence drilling in the Fitzroy Basin, in the Kimberley region, where geologists are now working. A National 100 rig is being assembled and will be shipped to Derby in July. Associated Freney Oil Fields is preparing to drill in the same region, where geological and geophysical work has indicated the probable existence of petroliferous rocks.

Authorities regard the Fitzroy Basin as next in importance to the North-West Basin, at Exmouth Gulf. A report on the Freney area—the Nerrima dome—states that Devonian rocks of the type present there are prolific producers of oil in other parts of the world; evidence suggests that 4,000 ft. of sedimentary rocks exist in this dome, below the Permian and above the basement rocks at a depth of 10,000 ft.

Enterprise of New Guinea Gold and Petroleum Development Company is the latest to enter the field of oil search. This company has been mining in New Guinea for a number of years, and for twenty years has been applying unsuccessfully for a permit to enter country on the Upper Sepik River near the Dutch border. The permit has now been granted, and the company's advance parties are now in the area carrying out preliminary work. A fully equipped expedition will follow. At the Australasian Petroleum Co. Pty. Ltd.'s territory, operations for the recovery of drill pipe stuck at a depth of 13,640 ft. are proceeding and about 500 ft. have been recovered. There is high gas pressure in this bore and the country is described as being very heavy and swelling. A recent report advises that the hole has been cleared to 11,778 ft. The company's Omati No. 2 well has been commenced and has reached a depth of 3,305 ft. Oil indications in this part of New Guinea have been regarded favourably, particularly in view of the high gas pressures, but great trouble in drilling has been caused by the very heavy swelling ground.

Western United States

(From Our Own Correspondent)

Portland, June 23, 1954.

The Administration, through Attorney General Brownell, is persisting in its effort to curb Communist activities in labour unions, a particular target being Mine, Mill and Smelter Workers' Union which has been expelled from C.I.O. as being Communist dominated. At a recent hearing before N.L.R.B. former officials of the union testified against it and particularly against Maurice Travis, its secretary-treasurer. If the board finds Travis guilty recognition of the union as a bargaining agency will be withdrawn. It is reported that M.M.S.W. officials are endeavouring to affect a tie with A.F.L. but anyone knowing Mr. George Meaney, president of the latter, does not expect any such negotiations to go very far.

URANIUM FOR COMMERCIAL MOTIVATION

The increasing interest in the possibilities of uranium as a source of commercial power has broadened the outlook for this metal although there are some differences of opinion as to its future. There are those who feel that the commercial application of atomic power is so far in the future that development with that end in view is entirely premature and, in fact, that some of the investors now planning extensive expenditures will be left holding the sack when military demands are satisfied. On the other hand there are those who estimate that military demands will continue for another eight years at least and cite the fact that A.E.C. has extended its guarantee of prices until March 31, 1962. By that time it is expected that development towards the use of uranium for commercial power will be sufficiently advanced so that there will be little if any slackening of production in changing over from production for military purposes.

In addition to the recently launched submarine to be operated by atomic power the possibility of its use for surface ships is being definitely considered by the Navy and the next step naturally would be for power plants on land. One source says that commercial production of power may commence within the next decade.

Any figures on uranium production are, of course, unavailable but the most recent report on activities is that 525 mines are in production, nine processing plants in operation, one under construction and one being enlarged. A.E.C.'s 1955 budget carries an item of \$12,000,000 for plant construction. While by far the greatest activity is in

the Colorado Plateau region, reports of discoveries and developments are constantly coming in from various points throughout the West.

THE COPPER INDUSTRY

After a 30 day trial run A.S. and R. has started regular production at its Silver Bell unit near Tucson, Arizona (*Mining Journal*, July 3, 1953). Silver Bell lay idle for 25 years until A.S. and R. realized its possibilities as a large low grade producer and in 1951 commenced a \$17,000,000 development. Two open pits are operated and 7,500 tons will be mined daily. The ore averages .9 per cent copper and annual output of 18,000 tons of metal is expected. Silver Bell is fortified by a D.M.P.A. contract to purchase 177,000,000 of the first 197,000,000 lb. produced at a price adjustable to the cost of production. A time limit of 5½ years is set on the contract but the operation is expected to extend for 10 to 11 years.

EXPLORATION FOR LEAD-ZINC

Pend Oreille Mines and Metals Co. has completed the third 800 ton unit at its flotation mill at Metalline Falls, Washington, thus finishing a construction programme that was commenced in 1948. Until there is an improvement in the zinc market the new unit will be used as an alternate to the other two.

Extensive exploration by diamond drilling will be undertaken on an area of 2,700 acres in the Tintic district in Utah by E. J. Longyear Co. in a co-operative agreement between Longyear and three of the larger operating companies. The Tintic district has received little publicity but for 75 years has been a steady and profitable producer of lead, zinc and silver and over years at a time has had more dividend paying mines than any of the more publicized mining districts of the country, ores of sensational value being not uncommon but not given publicity.

In the Coeur d'Alene district A.S. and R. has acquired the old Galena lead-zinc flotation mill and will increase capacity from 125 to 350 tons to treat the ores of the Vulcan mine which are taken out in the course of development. Eureka Corporation (Ventures Ltd.) announces that shipping from the recently discovered ore body now being developed by the Buffam shaft will commence within a year. The ore is of a grade that will permit shipping direct to the smelter.

ASSOCIATION OF IRON AND TITANIUM

Another discovery of titaniferous iron ore in Wyoming similar to that reported in *The Mining Journal* of March 19, 1954, is reported, this time from Sheep Mountain in the vicinity of Laramie. The deposit has a surface exposure 1 by 2½ miles and preliminary sampling indicates a content of 35 per cent iron, 28 per cent titanium and .04 per cent uranium.

The government has entered into three more contracts for titanium, amounting to 19,000 tons annually. Electrometallurgical Co. has been allotted 10,000 tons, Dupont 7,200 and Dow Chemical 1,800 tons.

Continental Sulphur and Phosphate Corporation of Texas has let contract for construction of a sulphur refinery to utilize a newly developed process in treating extensive surface deposits at Sulphur, Nevada. These deposits have been known for many years but their exploitation has been awaiting a suitable process.

Alcoa has started operation of its new four-potline plant at Rockdale, Texas. This plant has an annual capacity of 90,000 tons and will bring the state's output to 260,000 tons, second only to Washington as the largest in the country. The plant is unique in that the electricity used is produced by steam turbo-generators using lignite.

DRILLING MUD—I.

Water Base Drilling Mud

This is the first of two extracts taken from an article presented at a drilling symposium held at the University of Minnesota, United States, during October last year by W. D. Lacabanne, assistant professor of petroleum engineering at the University. The drilling fluid system is regarded as the crux of the rotary oil drilling rig, and the paper was originally presented in the hope that some of the features of drilling fluids would be regarded as of use in diamond drilling, and in consequence the primary viewpoint of the paper has been directed towards diamond drilling. The initial portion of the article deals more particularly with the functions and structure of drilling fluid, while the subsequent instalment discusses principally the testing methods employed.

Drilling fluids may consist of clear water only, of water and clay materials in the form of a mud (thick or thin depending on the amount of clay) or a more complicated suspension of water containing finely divided materials of various kinds and chemicals. The drilling fluid, by means of powerful pumps, is circulated in the drill hole usually down through the drill rods to the bit where the mud fluid emerges, returns to the surface through the annular space between the drill rods and the hole, thence to a settling ditch or a vibrating screen which removes the sand particles and drill cuttings, and finally flows to the storage tank for recirculation to the drill hole. The drilling fluid should have the necessary properties to help promote safe and rapid drilling.

FUNCTIONS OF DRILLING FLUIDS

A drilling fluid must perform simultaneously a large number of complex functions, and this is a large requirement for a single system. These functions are as follows:

Removal of Cuttings from the Hole: Rock cuttings at the bottom of the hole produced by the cutting action of the drilling bit are removed to the surface by the circulating drilling fluid without interrupting the progress of drilling. Removal of cuttings and making hole go on simultaneously. Cuttings, of spherelike to platelike shape, and from very fine particles to large rock fragments which have possible varying specific gravities from low to high rock values, must be transported upwards through the rods or the hole annulus. The pumps must provide sufficient upward velocity to the circulating fluid to raise the largest, densest, and fastest settling particle; that is, the upward fluid velocity must exceed the greatest slip of any cutting particle.

But the circulating fluid needs viscosity and gelling properties. This viscosity decreases particle slip, thus lower upward velocities are needed, and if the pumps are stopped for any reason the gelling of the mud locks cutting particles in place in the hole. The locking of cuttings in the stationary mud column by gelation prevents the cuttings from slowly sinking and settling around the bit and rods and freezing them. Viscosity and gelling properties are easily added to a simple drilling fluid. Though smallness of particle size, small differences in specific gravity between the particles and mud, and high viscosity and gelling behaviour of the mud create conditions of low settling rates of particles while moving up the hole, these same conditions at the surface prevent the settling out from the mud of cuttings and sand particles. The desirable downhole features of the mud to lift cuttings are undesirable at the surface in the ditch or mud tank and hinder the cuttings from settling out of the fluid.

Cooling the Bit and Drill Rods: The circulating mud fluid cools the bit which becomes heated from its cutting action in the rock and also cools the drill rods which encounter friction in rotating against the sides of the hole. The drill hole is a confined space and acts as a thermal insulator due to the poor heat conductivity of the rock. Thus, the frictional heat developed in the hole by mechanical action of the drill tools would accumulate and build up to high temperatures unless removed by the cool circulating fluid.

Lubrication of Bit and Drill Rods: The lubrication of mechanical parts in rubbing contact reduces the friction between them and likewise the lubrication of the drill bit and rotating rods by the circulating mud fluid reduces the friction between them and the rock. Power required for rotation of the tools is reduced and perhaps, more important, wear on the rotating rods is lessened. Also, the presence of a low resistance film on the walls of the hole permits easier pulling of rods. Good lubricating properties can be imparted to mud fluid by addition of small quantities of bentonite.

Wall Plastering Action and Mud Cake Formation: In the drill hole, mud fluids under the condition of excess hydrostatic head over formation pressure, will plaster the hole walls with a thin to thick, soft to hard, mud layer or mud sheath. Plastering action is assisted by the rotating drill rods. The existence of a mud cake in the drill hole may have far reaching effects on the success or failure of drilling. The mud cake is formed in the hole when the greater pressure of the mud column forces the liquid portion of the mud into the fine porous rock and leaves the solids of the mud behind on the rock wall as a dewatered semihard layer. The suspended mud solids, unable to follow the mud water into the fine rock pores are left behind on the rock wall as a hardened mud layer or cake and the lost mud liquid is known as the filtration loss.

PREVENTATIVE ACTIONS

The mud fluid has, amongst its varied properties, the ability to provide several beneficial preventative actions.

Prevention of Wall Caving: Unsupported weak drill hole walls tend to break off and fall or cave into the hole. Some formations wetted by drilling water may soften and later slough off into the hole or they may swell and diminish the hole diameter at the location of the swelling formation. Unconsolidated formations are most likely to cave. The physical presence in the drill hole of a column of mud fluid with its hydrostatic head or pressure exerts a counteracting push against the drill hole walls and helps to support and hold in place weak walls which would otherwise cave.

Preventing Water Influx: Water under pressure is often encountered when drilling through porous formations and the deeper the formation the greater the hydrostatic pressure. Such water may and often does flow into the hole to give trouble but may be controlled by a column of mud fluid of the proper weight. The hydrostatic head of the mud column may be raised and made greater than the formation water pressure by increasing the quantity of clay solids to the drilling fluid.

Mud Fluid Jetting Action: Under high pump pressures a mud fluid at the bottom of the drill rod string emerges from the bit openings at high velocities and impinges or jets on the formation rock ahead of the bit cutting-edges. The mud jetting action assists the bit in its rock-cutting functions and where the rock is not too flintlike the rate of drilling is increased in proportion to the mud circulation rate. In soft formations the jetting action does more digging than the bit. Thus mud pumps are important to rate of drilling.

Casing Reduction: A good mud, that is controlled properly in the well, may reduce the amount or number of strings of casing required to protect and maintain the drill hole in workable condition. Sufficient hydrostatic head, good plastering properties and low water loss to formation, may hold up the walls of the hole, maintain full hole diameter, and control loss of mud from the hole to the formations or prevent influx of water from the formations to the drill hole. Thus, a drill hole may be kept in workable condition without the need for a string of casing which otherwise, without the help of mud in the hole, would require casing or an extra string of casing.

Other Considerations: The primary purpose of the diamond drill hole is to secure accurate subsurface mineralogical and geological information, usually in the form of drill cores or cuttings. The characteristics and properties of the drilling mud must be such that good cores and cuttings, representative of the formations, and perhaps good electric logs, will be obtained. Water base drilling fluids do not possess properties which might endanger health or limb.

COMPOSITION OF DRILLING MUD

The composition of a water base rotary drilling fluid consists of three principal parts, the liquid phase, the soluble phase and the suspended phase. The liquid phase consists of water, the soluble phase of chemicals and the suspended phase of both inert or chemically inactive and colloidal or active particles. Some soluble chemicals commonly found in clays and earth formations are the chlorides and sulphates of sodium, calcium, and magnesium. The inert coarse fraction of the suspended phase consists of particles of clays, silts, and sand, and cuttings that have diameters between one half micron and one fourth of an inch or larger while the active colloidal fraction is composed of exceedingly fine particles of bentonite and good mud clays that have diameters between one thousandth of a micron and one half micron. The water provides the vehicle of suspension for all the particles and the medium of solution of the solubles, the inert particles supply mud weight, and the chemically active colloids affect the important mud properties of viscosity and gelation.

PROPERTIES AND CHARACTERISTICS

The properties of rotary drilling fluids may be divided into two parts, the functional, or the inherent mud properties, and the operational, or mud behaviour properties

under operating conditions. The most important functional properties are the viscosity, gel strength—which depends principally upon colloidal particles and chemical treatment—and density, which provides the hydrostatic head, and all three properties vitally affect the carrying power or the ability of the mud to transport cuttings from the well.

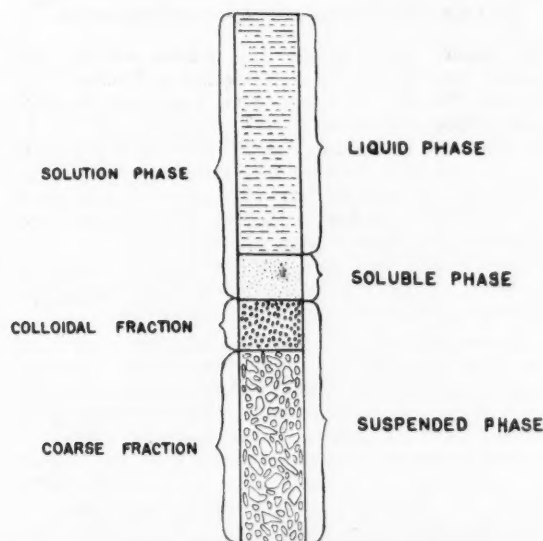
IMPORTANCE OF FILTRATION CHARACTERISTICS

The principal operational properties of the mud fluid centre on its filtration characteristics. Filtration loss, or water-loss to the formation should be low and a low filtration-loss usually gives a thin, impermeable filter cake which protects swellable formations from becoming water-wetted. The particles in the mud, their shape, size distribution, concentration, and degree of dispersion, affect the plugging or sealing ability of the mud cake. Coarse particles of poor size distribution build thick, porous, cakes, while large percentages of fine to colloidal size particles of good size distribution build thin, tough, impermeable mud cakes.

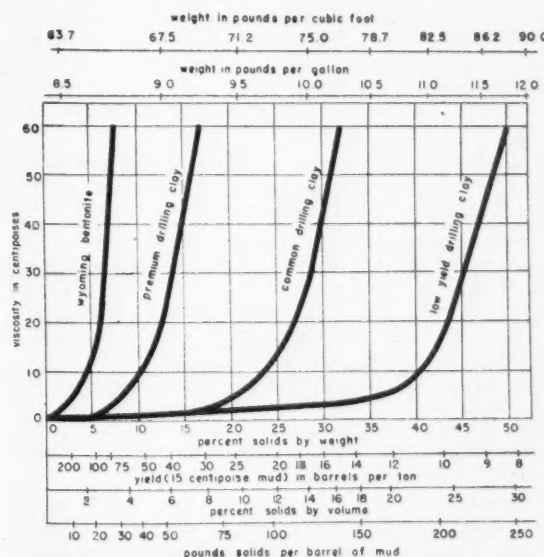
When solids are added to water and the dissolved salts are not considered, the viscosity, density and gelation of the mud changes with the percentage of solids present. Also, the character of the added solids is an important factor. Briefly, the general features of the mud changes are:

- Solids of high colloidal and low inert particles content that are added to water in relatively small percentages greatly increase mud viscosity while mud density changes but little.
- Solids of high inert and low colloidal content that are added to water greatly increase mud density but with little change in viscosity until a critical percentage of solids added is reached. At this point the viscosity increases suddenly and steeply. The addition to water at room temperature of poor mud-yielding clays up to an approximate percentage of 42 per cent by weight changes the mud density from 8.4 to about 10.9 lb. per gallon. Mud viscosity rises only slightly.

The mud-making properties of a clay are characterized by their yield of usable mud fluid and the yield is defined as the number of barrels of mud of 15 centipoise viscosity per ton of dry clay. Highly colloidal materials give a high-yield of approximately 90 bbl. of usable mud fluid per ton while poor type clays give a low yield of as little as 10 bbl. of mud fluid per ton. The graph below illustrates typical yields.



Composition of a rotary drilling fluid



Typical clay yield curves

The Beneficiation of Tungsten Ores

Tungsten is an important strategic metal in modern industrial economy and in the United States the tungsten industry was aided last year by the extension of the termination date of the D.M.P.A. tungsten programme to July 1, 1958, or until 3,000,000 s.tons have been purchased, whichever goal is first achieved. Approximately 19 per cent of that tonnage had been reached by the end of last year. Although for many years U.S. domestic production has not been sufficient to meet national requirements this position was reversed in 1953 when domestic production actually exceeded consumption. Due to wide variations in the price paid for tungsten concentrates in the United States over many years, the mining and processing of the mineral has traditionally been associated with considerable risk, and for this reason large areas of ground indicative of favourable deposits have never been fully examined. With a stable price for tungsten, however, which is tied to costs of labour and materials in the United States, low grade tungsten deposits in that country can be profitably mined and treated. The following notes, condensed from the text of a report issued by the American Cyanamid Company, describe the economic beneficiation of these ores. The methods and reagents described are, of course, largely covered by patent.

Tungsten minerals have a relatively high specific gravity (5.4 to 7.5) and gravity concentration methods are commonly used for recovery of the tungsten minerals, particularly the coarser sizes. Jigs and tables have been and are still being used ahead of flotation. Heavy-Media Separation has proved successful on some ores. The Dutch State Mines Cyclone Separator Processes are suitable for concentration of the intermediate size range falling between those sizes amenable to treatment by Heavy-Media Separation and those which can be treated by froth flotation.

IMPORTANCE OF FROTH FLOTATION

To obtain suitable concentrate grade and recovery many tungsten ores must be very finely ground to liberate the tungsten values from the gangue. In the treatment of most American tungsten ores froth flotation is essential to obtain an economic concentrate grade and tungsten recovery. In most tungsten mills flotation is the major method of beneficiation following treatment of the coarser sizes by gravity.

If the tungsten ore contains sulphides, these sulphides are generally floated off first. Due to the lime usually present in these ores or in the water used, soda ash is almost always needed to float iron sulphides ahead of the scheelite or powellite. This is used together with a xanthate promoter such as Aero¹ Xanthate 301, Aero¹ Promoter 404 or the Aerofloat² Promoters, such as Aerofloat 25, 31, 238 or 242 Promoter.

The tungsten minerals scheelite and powellite, commonly occurring in the Western United States deposits, are floated using regulators such as soda ash, sodium silicate and quebracho; a dual promoter consisting of oleic acid and either Aero Promoter 708, 710 or Reagent S-2043. The most efficient promoter combination consists of equal parts of the oleic acid and one of the other three. Reagent S-2043 is an experimental American Cyanamid Company promoter. Frothers most generally used include Aero-froth² 77 Frother, cresylic acid, pine oil, and Aerosol³ 18 Surface Active Agent or Oronite D-40 detergent.

Tungsten flotation, however, is seldom a simple problem. Since most tungsten ores tend to slime, a de-sliming step before flotation may prove economic.

Almost invariably, gangue diluents must be removed from flotation concentrates. The two most common methods used are (1) acid treatment with HCl to remove apatite and carbonates, and (2) autoclaving at a high pressure and temperature with soda ash or caustic soda. By method 2, the molybdenum and tungsten are dissolved and separated from the gangue diluents. The molybdenum is precipitated first as a sulphide and the tungsten is then precipitated with lime as a synthetic, molybdenum-free, scheelite. This is the common method of treatment used for powellite ores in the western United States.

In American tungsten flotation plants soda ash is used almost exclusively as a pH regulator, and the optimum pH range is from 9.2 to 10.2. The use of caustic soda has not proved beneficial, except where a pH of 11 or higher is

required to precipitate calcium and magnesium from extremely hard water. Recent work has shown that soda ash alone will not precipitate calcium and magnesium present in hard waters, and solubilized from tungsten ore itself. In such cases, the use of caustic soda together with soda ash, and pH control at 11 or thereabouts, is necessary to prevent precipitation of the fatty acid promoters as insoluble calcium and magnesium salts.

Sodium silicate is used for pulp dispersion if soda ash alone is not effective for dispersion. Sodium silicate will also tend to depress garnet. Quantities used vary from 1.5 lb. per ton of ore to as high as 10 lb. per ton in rare instances. It is customary to add from 30 to 60 per cent of the total sodium silicate required to the last cleaning step. This is important because it keeps the cleaner pulp dispersed, particularly in cases where hard desert waters are used, and is a factor which is often overlooked.

Sodium cyanide is used for depressing sulphides, either the original sulphides in the ore if no prior sulphide float is made, or to depress sulphides missed in the sulphide float and carried through to the tungsten float. The most effective place of addition is in the cleaner circuit.

Quebracho is generally used for carbonate depression. The depression of fluorite or apatite during scheelite or powellite flotation is a difficult problem.

Preliminary field testing with Aero Modifiers 158 and 162 has indicated that they may have a place in tungsten flotation as addition agents. Use in the final cleaning step, along with sodium cyanide and sodium silicate, in quantities of the order of .001 to .05 lb. per ton has shown promise in improving concentrate grade.

CYANAMID REAGENTS AND PROMOTERS

At tungsten plants in the U.S. treating scheelite and powellite ores, oleic acid is used together with either Aero Promoter 708, 710 or experimental Cyanamid Reagents S-2043, S-2044, S-2046 or S-2047. Blown tall oil can be used with oleic acid. The ratio of oleic acid to the other promoter varies, but the most widely used combination has been 50 per cent oleic acid and 50 per cent of either Aero Promoter 708, 710 or Reagent S-2043. At the present time no Western U.S. plant is using fatty acid emulsions. Very promising results have been obtained with a mixture of experimental Reagents S-2046, S-2047 and S-2043, and this combination is currently receiving intensive study.

Unfortunately, effective tungsten promoters are also often good promoters for undesirable gangue minerals. Reagent control is of the utmost importance, and such promoters as oleic acid and the other commonly-used collectors must be added with caution and judgment. Excessive promoter addition produces a tough, matted froth which will not clean readily; the desirable froth structure is a loose type of froth somewhere between a matted froth and a lacey froth.

Many investigators have stressed the importance of froth

structure in maintaining tungsten concentrate grade. Many frothing agents and froth modifiers have been treated at the Stamford Mineral Dressing Laboratory of the American Cyanamid Company, and among the most promising are Aerosol 18, Aero Promoter 807 and Reagents S-541 and S-641. In scheelite flotation .10 lb. per ton of wetting agents or detergents is optimum, and the upper limit of addition of any of these is probably .2 lb. per ton. If more froth is desired, it should be obtained by adding more Aero Promoter 708, 710 or Reagent S-541, S-641, S-2043, cresylic acid, or an Aerofroth Frother. The use of detergents should be kept at a minimum, and eliminated if possible.

At its Stamford Laboratory the American Cyanamid Company has attempted to develop a specific "tungsten reagent" which would combine all the properties essential for good tungsten flotation. While excellent results can be obtained with some combinations on one or two ores, no one, fixed, combination of ingredients worked on all tungsten ores. Indications are that each tungsten ore requires a specific reagent combination, the components of which must be adjusted in amount and point of addition to meet the particular local problems involved. Better metallurgical results can be obtained by experimenting with each reagent alone, rather than as a combination with others in a tungsten speciality reagent.

However, when an effective combination is discovered for an individual mill or mine, it is often desirable to make up a mixture of these reagents for ease in feeding.

Promising results have been obtained by American Cyanamid on ferberite, wolframite and huebnerite ores with the Cyanamid 800 Series Promoters. The use of these promoters is not feasible on acid-consuming ores and those

ores containing sulphide minerals, especially pyrrhotite. These sulphide minerals must be largely removed before the acid conditioning step prior to flotation with the 800 Series Promoters.

Application of the 800 Series Promoters to the iron-manganese-tungsten group of minerals involves the following steps. The ore is thoroughly deslimed using a dispersing agent such as sodium silicate, caustic soda or soda ash, if required. The deslimed sands are then conditioned at a high pulp density (70 to 80 per cent) with enough sulphuric acid to give a pH of 2.5 to 3.5 in subsequent rougher flotation. Aero Promoters 801, 824 or 825 are also added during the conditioning step in amounts of 2 to 4 lb. per ton. Similar amounts of fuel oil are also added to the conditioner. Conditioning is generally carried on for 2 to 4 min.

The pulp is then diluted and a rougher tungsten concentrate floated off. Float should be quite rapid with a dry, heavily-flocculated mineralization in a froth slightly on the scant side. A voluminous or matted froth should be avoided. A single cleaning with only small amounts of collector and frother follows. In some cases a second cleaning step using hydro-fluoric acid may be advantageous.

Excellent recoveries have been obtained by this procedure but concentrate grades are generally lower than market specifications. Subsequent treatment may, therefore, be required.

REFERENCES

- ¹ Aero is a trade mark of American Cyanamid Company applied to flotation reagents and chemicals used in ore beneficiation plants or processes.
- ² Reg. U.S. Pat. Off.

The Canadian Asbestos Industry in 1953

The Canadian asbestos industry is almost entirely an export industry—a fact of which other producers of late have had cause to become sharply aware. The article which follows, condensed from the U.S. Bureau of Mines, *Mineral Trade Notes*, Vol. 28 No. 3, reviews the progress of the asbestos industry in Canada during last year. Although it is concerned mainly with the mining developments recorded by the various producers, it should be borne in mind that much of this Canadian industry's success has been due to its efficient marketing methods and to the maintenance of high quality standards.

The year 1953 was another good year for the Canadian asbestos mining industry. Total shipments from mines, of all grades, aggregated 910,848 s.tons compared with shipments totalling 928,487 s.tons in 1952. The 1953 figure remains higher than production in any year before the record year 1951.

	1952	1953
	(Short tons)	
Shipments from Quebec Province:		
Crude	717	772
Spinning, shingle, and paper stocks	328,254	299,313
Waste, stucco or plaster, refuse or shorts, and sand	576,627	583,898
Total for Quebec	905,598	883,983
Shipments from other Provinces (principally Ontario), all grades	22,889	26,865
Total Canada	927,487	910,848

Exports of asbestos from Canada total about 97 per cent of total production, and only a small part of the output (less than 30,000 tons) is used in Canada. Exports to all countries were 878,530 s.tons in 1953, compared with 902,058 tons in 1952.

As the chief market for Canadian asbestos, the United States took approximately 70 per cent of the output for 1953. Other countries that purchased the largest quantities

of the remainder were the United Kingdom, Belgium, France, Germany and Japan.

In a published report relating to production and export market conditions for Canadian asbestos in 1953, the president of the Asbestos Corporation said that elsewhere in the world, asbestos production had also been maintained at high levels, and competition from other sources, particularly Russia, had been more apparent during the past year and was expected to continue throughout 1954. At the same time Canadian standards and qualities ensured that Canada's position as the major source of the world's supply of chrysotile asbestos remained unchallenged. Nevertheless the demand for all grades was keen throughout the year and the reduced requirement for short grades which was noticeable during part of 1952 proved only temporary and in 1953 shipments of these grades were again at a normal level. The acute and long standing shortage of the long staple fibres (spinning grades), required primarily in the defence industries, has been somewhat relieved as a result of the lower level of activity in these industries.

The market outlook for Canadian asbestos in 1954 is regarded generally as good. Some informants foresee larger sales of long fibres in 1954 and smaller sales of the shorter fibres. The total tonnages of sales may be smaller than in 1953, but the value is expected to be about the same. Canadian companies have made no change in prices since February, 1952, when a rise of about 10 per cent occurred,

and no change in prices appears to be contemplated for the immediate future.

PRINCIPAL PRODUCERS

Eight companies are the principal asbestos producers in Canada. They are, Canadian Johns-Manville Co., Asbestos Corporation, Johnson's Company Ltd., Bell Asbestos Mines, Quebec Asbestos Corporation, Nicolet Asbestos Mines, Flintkote Mines, and Cassiar Asbestos Corporation. The Canadian Johns-Manville Co. as the leading producer, has had in recent years an output of more than 50 per cent of Canada's total asbestos production. In 1953, output of Canadian Johns-Manville was 56 per cent of the total.

Among certain companies which have been formed but which are not yet producing commercially the following two companies were mentioned at the beginning of 1953 as being the most likely to come into production in the near future; namely the United Asbestos Corporation and the Dominion Asbestos Mines, although neither was in production at the beginning of 1954. The Dominion Asbestos Mines was in production for a short period in 1953, but stopped operations pending financial reorganization. United Asbestos Corporation has not yet begun development of its properties.

EXPANSION DEVELOPMENTS IN 1953

Of the eight producing companies listed, the following four were reported to be still operating at the end of 1953 at about the same scale as in 1952, with little or no change reported in their capacity: Bell Asbestos Mines, Quebec Asbestos Corporation, Nicolet Asbestos Mines, and Flintkote Mines. The principal developments related to the four other producers, and to the United Asbestos Corporation and the Dominion Asbestos Mines.

Canadian Johns-Manville is completing a large new mill at its Jeffrey Mine, reported to be the largest operating asbestos mine in the world. The new mill is scheduled for completion in the latter part of 1955, and eventually will replace existing facilities and increase overall capacity. The first stage of the new mill, with about one-fourth of the eventual total capacity, is expected to be completed and in operation by July, 1954. Total cost of the new construction, including underground facilities, is now estimated at \$21,000,000.

Asbestos Corporation is the second largest Canadian producer. Preliminary work was begun in early 1952 to develop a new mine known as the Normandie mine, near the Vimy Ridge property of the company. Development involves construction of a mill with a capacity of 5,000 tons of ore daily, production to begin in the latter part of 1954. The cost of construction work at the Corporation's Normandie mine is now estimated at \$14,500,000. Ore reserves at this mine are about 20,000,000 tons. Operations at the company's existing mines have been proceeding normally with little change.

A new 4,000-ton daily capacity mill, which Johnson's Company Ltd. has been constructing near its property in the Thetford Mines' area, is nearly completed and ready for operation. This new mill is regarded as an important development that will add considerably to the total output of asbestos in Canada. Cost of the new construction is about \$8,000,000. The company is one of the oldest Canadian producers and the third largest now in operation.

Cassiar Asbestos Corporation, which in 1952 began working the first important asbestos mine to come into production in British Columbia, continued successful development of its property in 1953. Sources in Montreal are unanimous in saying that Cassiar has an important ore body with an exceptionally high quality of asbestos.

Some 250 tons of ore per day are being treated in a temporary mill capable only of partial recovery of asbestos fibre. It is expected that a new 500-ton milling unit will be completed and in operation by June, 1954. This mill has been designed to permit expansion to a larger capacity with a relatively small additional capital expenditure. Total ore reserves, previously estimated at 5,900,000 tons, are now estimated to be 7,200,000 tons, with a value of about \$30 per ton of 3K and 4K fibre. Capital costs for the mill and other construction and development are estimated at \$5,000,000.

During the last few years the United Asbestos Corporation has been endeavouring to make financing arrangements for developing an ore body that lies mainly under Black Lake, Quebec, and involves high initial capital costs for development. After extensive engineering studies, an agreement was reached in 1953 with the American Smelting and Refining Co. whereby the latter, through its subsidiary, the Lake Asbestos of Quebec, Ltd., will place the Black Lake property on a production basis provided final authorization for drainage of the lake can be obtained from the Quebec provincial Government. Although provincial legislation relating to drainage of the lake was enacted early in 1953, a definite order to permit drainage by the Lake Asbestos of Quebec, Ltd., has not yet been issued. If the final approval for drainage is received as expected, the company will spend about \$4,000,000 in 1954. It is hoped that the initial production of asbestos can begin in about 18 months. The overall cost of the project, including construction of a mill with capacity of 5,000 tons daily, is estimated at \$20,000,000. Proved ore reserves are said to total about 48,000,000 tons with a value of about \$500,000,000.

Production by Dominion Asbestos Mines was begun in 1953, and about 10,000 tons of fibre were produced on a more or less experimental basis. Owing to financial difficulties, however, the operations were stopped late in 1953, pending reorganization. According to the press, arrangements were made with an American firm, the National Gypsum Co., whereby the latter was given a 90-day option to acquire the assets of the Dominion Asbestos Mines in exchange for shares of the American concern. Latest reports say that the National Gypsum Co. has decided not to exercise this option. The future of this company therefore seems uncertain.

It is estimated that total expenditures on asbestos development projects now under construction or recently completed in Canada will exceed \$50,000,000; including more than \$45,000,000 in Quebec province, about \$5,000,000 in British Columbia, and some expenditures in Ontario. Production in Ontario, which was almost negligible before 1949, has been developing in recent years and now totals about 25,000 tons of fibre annually.

EXPLORATION

No important new finds of asbestos ore were reported in Canada in 1953. Exploration is being carried out in Quebec, Ontario, British Columbia, and Newfoundland.

Late in 1953, it was reported that discoveries of asbestos ore (crocidolite) had been made along the main iron-ore belt traversed by the Quebec Labrador railway. One of the major Canadian companies is now investigating the possibilities of developing these deposits, believed to be the first find in North America of this type of asbestos.

Estimated known reserves of asbestos in Canada are enough for more than another 30 or 40 years, at the present rate of mining. There is little definite information available as to actual tonnage of ore reserves. In 1953 a definite curtailment was noticed in exploration expenditures by asbestos mining companies in both Ontario and Quebec, compared with 1952 and 1951.

MACHINERY AND EQUIPMENT

N.C.B. to Adopt the Marion 7400

It was announced earlier this week that John Blackwood Hodge and Co. have negotiated a contract with the National Coal Board for the supply of two model 7400 Marion walking draglines for use on the Board's opencast coal sites. The Blackwood Hodge organization, in addition to manufacturing their own range of earth moving equipment, acts for the Marion Power Shovel Company over here, and readers may recall the detailed description of the first Marion 7400 to be installed in this country published in our issue of March 24, 1950 (page 291).

On that occasion the dragline, which was designed for use on the United Steel Co.'s iron ore beds at Scunthorpe, was equipped with a 175 ft. boom and 12 cu. yd. bucket.

The two draglines on order for the N.C.B. will, however, considerably exceed these specifications and, with a 280 ft. boom and 20 cu. yd. excavating bucket, they will be among the largest draglines in the world. The announcement gives no indication of the maximum dumping height or digging depth which this exceptionally long boom will make possible, but it seems reasonable to assume that these machines will be used on opencast sites with exceptionally thick over-burden. In the case of the Marion dragline supplied to the United States Co., the maximum digging depth under normal conditions was about 80 ft.

The two draglines now on order are due for delivery before the end of this year and, erected on site, will together cost about £1,200,000. They are designed for a life of upwards of 30 years, so if the cost is to be amortized over a period anywhere near as long as this, it may safely be inferred that the sites to be worked are extremely extensive and moreover that any idea of opencast coal mining in this country being a temporary make-shift expedient has finally been discarded, and that these methods are here to stay.

Automatic Brake for Manriding Car

At Haigh Colliery, near Barnsley, a drift 180 yards long with a gradient of 1 in 2 is being used for carrying miners on manriding cars. Because of the steepness of the gradient it has been necessary to find a means of stopping the manriding cars if the haulage rope or its attachments fail, and a manriding car and device to overcome this danger has been devised.

The car runs on a single track haulage road and is drawn up and down the drift by a rope from an electrically driven haulage gear at the drift top. At each side of the track, about 18 in. from the floor, runs a $\frac{1}{4}$ in. diameter steel dead rope. Each rope is secured at the drift bottom, runs the full length of the drift and at the drift top passes over pulleys and into a weight frame. Each rope is weighted equally so that their total weight balances that of a loaded car.

The safety device is carried on a trolley attached to the rear of the car. The two dead ropes pass through a pair of clamps, one on each side of the trolley. The drawbar, to which the haulage rope is attached, is connected by two arms to an eccentric disc in each clamp. When the haulage rope is taut the draw bar holds the eccentric discs away from the safety ropes. But if the haulage rope slackens or breaks the drawbar is pulled back by a counter-weight and the clamp discs grip the safety ropes. When the device operates the ropes are gripped firmly and instantaneously, but there is no sudden stop because the rope weights absorb the shock and the runaway cars are brought smoothly to a standstill.

A Hand Operated Starter

The Berger Handraulic Starter, manufactured by Bryce Berger Ltd., is hand operated, power being made available by a simple combination of pneumatic and hydraulic principles. Working within a closed circuit the starter relies on no outside source of energy, and the only moving parts incorporated in its construction are two piston racks and a pinion. The starter is claimed by the manufacturers to start all types and sizes of engine, and is presented as being particularly useful in the case of oil engines

for contractors' plant, cranes, excavators, tractors, industrial units and mining machinery.

The unit offers a new system of engine starting, the principle and mechanism of which are a combination of established engineering practices. Further relevant facts concerning the unit are that the piston is under equal pressure on both sides and that the air is the compressible medium, the hydraulic fluid transmitting the energy, using standard hydraulics practice. This unit is flameproof and can conveniently be fitted to existing engines or incorporated in new engineering designs. There is no limit to the size of the engine which can be started on this system. The Berger starter is generally applied to the free end of the crankshaft.

The starter unit comprises two opposed cylinders, each containing a piston-rack which engages with a simple pinion. The focal point of the starter is the hydraulic accumulator, consisting of a cylinder tube in which a simple piston operates. The cylinder is filled initially with air compressed to approximately 2,800 lb. p.s.i. and then sealed. Hydraulic fluid is pumped into the accumulator in the underside of the piston which is lifted, the air above it being compressed to approximately 4,000 lb. p.s.i.

On operating the starter lever, the energy stored in the high pressure air in the accumulator is transmitted through the medium of the hydraulic fluid to the starter. The starting lever operates a two-stage valve, the first admitting sufficient pressure to the starter to engage it with the crankshaft. In the second stage, oil at full pressure is admitted to the heads of the piston racks and the crankshaft is rotated at high speed and with a high starting torque. The action of the starter resembles a sharp pull on the starting handle. When the engine starts, the dogs are automatically disengaged and on the release of the starting lever the piston racks return to their original positions under the influence of return springs, thus discharging the fluid to the feed tank ready for pumping up to the accumulator for further starts.

The type B50G starter is suitable for engines of approximately 6½ in. bore, weighs 88 lb., and has an average engine r.p.m. under starter impulse of 300/400. The type B35 is suitable for engines of up to approximately 4 in. bore, weighs 75 lb. and has an average engine r.p.m. under starter impulse of 300/400.

Craftsmen Welders

A prestige film of the above title, designed for showing to clients, engineers, insurance companies and similar bodies throughout the world, has been made by Technical and Scientific Films Ltd. in association with the Film Producers Guild on behalf of Babcock and Wilcox. The object is to show the care that is necessary in the welding of present-day steam plant, and the measures taken in the training of Babcock welders.

The scope of the company's training course is explained in the form of an interview with two new entrants, one taking the oxy-acetylene course and the other the metal arc course. The film then shows the trainees undergoing their course, from drawing their tallies carrying the number with which every site weld they make will be stamped, to the highlights of their course. The more difficult extension course for Class B welders is then shown and finally the most difficult of all, the Class A. Instruction then follows in the method of magnetographic testing which Babcock and Wilcox have developed for non-destructive examination of butt-welds, and which has been accepted by the responsible inspecting authorities.

Important Locomotive Contract

The New Zealand Government Railways have placed an order with W. G. Bagnall Ltd., of Stafford, for the supply of ten, 240 h.p., 0-6-0 diesel mechanical shunting locomotives. The locomotives will be fitted with M4AA6 type oil engines manufactured by the National Gas and Oil Engine Co., and the transmission will include a five speed gearbox of Self Changing Gear Co. design and a Fluidrive hydraulic coupling. In working order each locomotive will weigh 30 tons. An exactly similar locomotive is in course of manufacture for the Tasman Pulp and Paper Co., also of New Zealand.

METALS, MINERALS AND ALLOYS

COPPER.—The firmness that has characterized recent dealing in copper has continued in New York. Domestic demand is both active and urgent since many consumers are pressing for supplies before their plants close down for the annual holiday. June sales are believed to have exceeded 105,000 tons against 99,000 formerly, while July supplies are believed to be extremely tight. Nevertheless, with dealing maintained at around 30 c. the New York market is without any marked feature.

Mr. E. S. Goodwin, of Westinghouse Electric Corporation, is reported as saying that "The 30 c. price is more firm to-day than at any time during the past twelve months. Prompt shipment of copper is difficult to obtain. There seems to be no large blocks of copper available anywhere throughout the world to act as a market depressant."

Meanwhile, the Chilean Government, which had earlier cut back production, is now reported to have sold their entire electrolytic production to mid-September and to have no further stocks available. Indeed, the Government is now alarmed at the threat of strikes at Chuquicamata, Potrerillos and El Teniente and has urgently asked that no action be taken before July 5; the strike is now due on July 8.

LEAD.—Although the American lead market has recovered from the shock of the G.S.A.'s refusal to pay 14½ c. for metal offered, demand is still no more than quietly steady. Both buyers and sellers are believed to be holding off from the market and are thought to be waiting to see the effects of G.S.A. buying rather than the texts of directives.

U.S. Bureau of Mines figures for the first quarter of 1954 show a decline in lead consumption of about 8 per cent compared with 1953 but a rise in April over March of about 500 tons. Stocks at consumers' plants rose by 4,000 tons during the month. On the other hand, the American Battery Manufacturers' Association reports a rise in the first quarter of 1954 on the same period of 1953 from 6,635,000 to 6,950,000 automobile replacement battery units.

TIN.—The past week saw the addition of enough signatures to the draft International Tin Agreement for it to take effect if the signing countries now proceed to ratification. All six producing countries have now signed, and only four of the 18 consuming countries at Geneva have not come in. In addition to U.S.A., these are Germany, Brazil and Switzerland. We considered some of the implications of ratification in our leading note last week on page 767.

The report of the Senate Sub-Committee, under the chairmanship of Senator Malone, which recommended the development of Western Hemisphere mineral resources and the avoidance of reliance on "remote and possibly unfriendly or neutral" countries for mineral supplies, caused a temporary stir but is not regarded seriously. The sub-committee's reported claim that American tin requirements could be met by Bolivia are well wide of the mark; not only is a half of Bolivian production regularly exported to Britain, but the ores cannot be treated satisfactorily without a mixture of higher grade ore from the East.

A more considered, and therefore threatening, view was given by Mr. D. B. Craver, vice-president American Can Company, who said that "because virtually all tin supplies come from overseas, much of it from Malaya and Indonesia" . . . "the reduction in the use of tin is extremely important to the American can-making and canning industries." He went on to claim that in 35,600,000 cans produced in the United States last year, only 28,000 tons of tin were used. He said that the elimination of tin from canning was part of the long-term research programme of American Can.

Meanwhile, the most notable change in U.S. tin statistics for April was that R.F.C. stocks of pig tin declined by about 4,500 tons. Since R.F.C. has continued to absorb Texas production and has sold no stocks it is estimated that about 9,000 tons were transferred to the national stockpile, making about 15,000 tons estimated to be so transferred this year.

ZINC.—The Prime Western E. St. Louis price continues

at 11 c. whatever the volume of G.S.A. purchases. Indeed, the American market continues to be very quiet and featureless and such buying as is taking place is only against immediate future needs. Such influence as overhang the market seem mostly to be of a depressing nature. U.S. Bureau of Mines reports that in the first quarter of 1954 slab zinc consumption was 275,316 tons compared with 359,197 tons in the same period of 1953, a fall of 23 per cent. Furthermore, during April, stocks of slab zinc at consumers' plants increased by about 7,800 tons, or 9½ per cent bringing the total of such stocks to 90,238 tons. On top of these depressing figures there is the threat of a strike in the steel industry unless United States Steel Corporation raises its previously rejected offer. The repercussions of the last steel strike on the galvanizing trade will not readily be forgotten.

CADMIUM.—The U.S. Bureau of Mines, in its review of this metal for 1953, estimates world production at the new record of 15,710,000 lb.—an increase of 15 per cent over 1952. Production in the States, which accounts for some two-thirds of primary world production, itself showed a substantial increase at 9,767,197 lb. (8,567,159 in 1952). Even so, the States was a net importer of metallic cadmium to the extent of about 1,500,000 lb., two-thirds of which came from Belgium, Luxembourg, and Canada. These imports appear to have been mainly surplus to current consumption as, at the end of 1953, total stocks held by the trade amounted to 3,361,000 lb. compared with 1,894,000 lb. twelve months earlier.

NICKEL.—An article in the current issue of the Bulletin of the National Association of Purchasing Agents in the States discusses the continuing extreme scarcity of nickel for civilian uses and points to the fact that, although larger supplies are in sight, Government stockpile demands still seem to be insatiable. It will be recalled that nickel controls were lifted last year in response to the clamour of private industry, although the O.D.M. warned that nickel would still be scarce for civilian users. In fact, as the N.A.P.A. bulletin points out, Government stockpiling was accelerated at about the time when controls were lifted, so that no benefit has been felt from the tapering off of immediate defence production requirements.

Some indication of what is happening to non-military users may be gauged from the fact that during a period of expanding nickel production the electro-plating industry, which accounted for 20 per cent of consumption prior to the Korean war, received only 7 per cent in 1951 and 1952 and although the proportion increased last year to 15 per cent it is now dropping again.

Provided that substitutes do not meanwhile make any substantial inroads on civilian markets, the assurances which have frequently come in the last year or so from the nickel producers that expanding consumer markets were on hand to offset any decline in military requirements seem solidly based.

QUICKSILVER.—The London quicksilver price continues to show considerable firmness and now stands at £97 10s. per flask ex warehouse compared with £90 four weeks ago. U.S. stockpiling pressure looks like being maintained with the news that the G.S.A. will be instructed to purchase mercury for the new long-term purchasing programme.

Although imports into the U.K. this year to date exceed 11,000 flasks, a figure which is well ahead of last year, little is left for resale as the bulk of the deliveries are coming in under contract.

TITANIUM.—The Union Carbide and Carbon Corporation announce plans for a \$1,000,000 plant for the production of titanium sponge by their subsidiary, the Electrical Metallurgical Company, at Ashtabula in Ohio. The plant will have an annual capacity of 10,000 tons.

URANIUM.—It is reported from Santiago that Chile is preparing to conclude an agreement with the United States for the joint working of radio active ores located in Northern Chile. According to the Chilean Minister of Mines a State monopoly will be decreed for uranium mining and a new corporation, Radioactiva Ores Corporacion, will be established for its operation.

Iron and Steel

The outstanding event in a week of favourable developments is the placing of a £5,000,000 contract with a group of British steel companies for the supply of permanent-way materials to Persia. Hitherto, the bulk of our steel exports have been consigned to Commonwealth destinations but inquiries for British products are now extending over a wider range.

The depression in U.S. steel has given place to a moderate revival which may be accelerated if a satisfactory wage settlement can be achieved. Still more noticeable is the turn of events in Western Europe, whence for the first time for many months German steel is now being exported at prices above the minimum levels prescribed by the Export Cartel. Moreover, extra charges are now being imposed for early delivery. Only a few months ago German manufacturers were fined for accepting export prices below the minimum.

These changes cannot fail to exercise a favourable influence upon British steel and there is already evidence that buyers are beginning to contract more freely for their requirements in the second half of the year.

There has been of late a considerable liquidation of stocks and some replacements are now necessary. Thus the flow of specifications tends to increase and in many departments production capacity is taxed to its utmost limits.

The import of steel semies has been reduced almost to vanishing point, home steel makers being well able to meet all requirements, whilst in the finished steel trade the most notable event is the improvement in the volume of business handled by the bar re-rollers. They have had a long time to wait for a revival but it seems to have come at last.

The London Metal Market

(From Our Metal Exchange Correspondent)

During the past week more signatures have been added in London to the draft of the International Tin Agreement, with the result that sufficient numbers of both consumer and producer countries have now signed to enable the Agreement to come into force subject to ratification. Apart from the United States, who, in the early days following the Geneva Conference, signified their intention to remain outside the scheme but at the same time to adopt a policy of "benevolent neutrality," the decision of Western Germany (with the third highest number of consumer country votes) not to participate for the time being has caused some surprise. As far as the markets in London and Singapore are concerned, the growing optimism as to the future of the Agreement has been reflected in the steady advance in price, amounting in the East to just over £15 per ton as compared to about £10 in the forward quotation in London during the past week. On Thursday morning the Eastern price was equivalent to £760½ per ton c.i.f. Europe.

The lead market remains fair in the U.K. with steady business reported from Europe. In America the present price level seems to be considered satisfactory by consumers, and producers are getting rid of their outputs with the help of the recent sales to the stockpile.

In zinc it was announced at the end of last week that the Ministry of Materials would continue to sell metal through the Market for another twelve months, but that the rate of disposal would probably be lower than at present. With the U.S. stockpile authorities not showing any desire to purchase large tonnages, people are paying more attention to the big stocks still in the States, and this has had the effect of causing a slight reluctance on the part of buyers throughout the world.

Both in lead and zinc further announcements are awaited regarding the future intentions of the General Services Administration in making purchases against the long-term stockpiling plan, and in this connection it is understood that for the financial year commencing July 1 the approval of Congress has to be given to any appropriations made for the purchase of these two metals.

There is still little first-hand copper available, but fair tonnages of Chilean metal which were bought by merchants are now trying to find a home, and it is probably owing to this that prices have receded a little in London. In the States the

scarcity has been acknowledged by the continuation of the suspension of the import duty on copper so long as the price remains above 24 c. per lb. Deliveries for June were again very high, and consumers are already taking interest in metal for delivery after the summer. At the end of last week it was announced that the Committee of the London Metal Exchange had encountered certain difficulties in the way of introducing a c.i.f. Electrolytic Wirebar Contract in addition to the existing Standard Contract. The matter is, however, being kept under review in the hope that a way round these difficulties may be found.

Closing prices and turnovers are given in the following table:—

	June 24		July 1	
	Buyers	Sellers	Buyers	Sellers
Tin				
Cash.....	£735½	£736	£755	£756
Three months.....	£734	£735	£747½	£748
Settlement.....	£736		£756	
Week's turnover....	760 tons		755 tons	
Lead				
Current month.....	£96½	£97	£96½	£96½
Three months.....	£94½	£95	£94½	£94½
Week's turnover....	2,000 tons		2,400 tons	
Zinc				
Current month.....	£78½	£78½	£78	£78½
Three months.....	£79½	£79½	£79	£79½
Week's turnover....	4,550 tons		3,925 tons	
Copper				
Cash.....	£239½	£239½	£239½	£239½
Three months.....	£237½	£237½	£237	£237½
Settlement.....	£239½		£239½	
Week's turnover....	3,800 tons		3,400 tons	

OTHER LONDON PRICES — JULY 1

ANTIMONY

English (99%) delivered, 10 cwt. and over	£210 per ton
Crude (70%)	£200 per ton
Ore (60% basis)	22s./24s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade)	£483 per ton
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OTHER METALS

Aluminium, 99.5%, £156 per ton	Osmium, £50 oz. nom.
Bismuth	Palladium, £7 10s. oz.
(min. 4 cwt. lots) 16s. lb.	Platinum, £30/£31
Cadmium (Empire), 13s. lb.	Rhodium, £43 10s. oz.
Chromium, 6s. 5d./7s. 6d. lb.	Ruthenium, £23 oz.
Cobalt, 20s. lb.	Quicksilver, £97 10s.
Gold, 248s. 11d. f.oz.	ex-warehouse
Iridium, £52 10s. oz. nom.	Selenium, 35s. 9d. nom.
Magnesium, 2s. 6d. lb.	per lb.
Manganese Metal (96%-98%) £225/£262	Silver 73½d. f.oz. spot and 72½d. f.d.
Osmiridium, £40 oz. nom.	Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth	60% 8s. 3d. lb. c.i.f.
.. ..	50% 7s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (lumpy)	£13 12s. per ton c.i.f.
Refractory	£13 4s. per ton c.i.f.
Magnesite, ground calcined ..	£26-£27 d/d
Magnesite, Raw	£10-£11 d/d
Molybdenite (85% basis) ..	102s. 4d.-103s. per unit c.i.f.
Wolfram (65%)	World buying 145s.-155s. nom.
.. ..	U.K. Selling 155s. + 10s. charges
Scheelite (65%)	World buying price nom.
.. ..	U.K. Selling 155s. + 10s. charges
Tungsten Metal Powder ..	15s. 3d. nom. per lb. (home)
(98% Min. W.)	
Ferro-tungsten	12s. 3d. nom. per lb. (home)
Carbide, 4-cwt. lots	£35 13s. 9d. d/d per ton
Ferro-manganese, home ..	£54 15s. Od. per ton
Manganese Ore Indian c.i.f. Europe (46%-48%)	6s. 8d. per unit
Brass Wire	2s. 6½d. per lb. basis
Brass Tubes, solid drawn ..	1s. 10½d. per lb. basis

COMPANY NEWS AND VIEWS

Union Minière's Increased Dividend

Like others interested in copper, shareholders of Union Minière will have been pleasantly surprised at the continued firmness exhibited by the copper price throughout last year. This fact, added to an increase in copper output at 214,000 tonnes (206,000) and a sizeable increase in cobalt production at 8,300 tonnes (6,800), has resulted in 1953 being a better year for the company than might have been expected twelve months ago. This is reflected in a recommendation by the board that the dividend distribution should be increased to 1,450 frs. per share compared with 1,250 frs. last year.

The text of Mr. Sengier's address to shareholders at last week's meeting is reported on page 24 together with extracts from the accounts and directors' report. Particularly encouraging is Mr. Sengier's report that despite the marked falling off in copper sales during the first two months of the current year the position is now so far improved that sales for this year have already been made amounting to 130,000 tonnes. With the present outlook for copper continuing very tight, shareholders of Union Minière should be able to look forward to another satisfactory year.

Mason and Barry's Severe Fall in Profits

A decline in the price of copper, increased costs and lower sales of pyrites experienced by Mason and Barry during the year to December 31, 1953, were responsible for a severe fall from £147,954 to £87,971 in the revenue of this Portuguese copper and pyrite producer. This, however, was not entirely unexpected for the chairman, Lt. Col. J. Cross Brown, in his statement to shareholders last June gave the warning that these factors would make 1953 a difficult year.

Year to Dec. 31	Working Profit	Other Revenue	Taxation	Net Profit	Dividends	Carry Forward
1953	£84,588	£3,383	£42,000	£701†	£15,277	£44,491
1952	144,719	3,235	77,125	23,040	20,369	48,468

† Before transfer of £12,000 from special reserve L=Loss

Accordingly, a decreased dividend of 15 per cent on the ordinary issued capital of £185,172 in £1 shares was paid against a total of 20 per cent in respect of the previous year. This dividend, however, could not have been met had it not been for the transfer of £12,000 from special reserve and a reduction in the carry forward.

Provided there is no drastic fall in the price of copper, said Col. Cross Brown at the company's annual general meeting held on June 22, and the necessary licences are forthcoming for pyrites exports, prospects for the current year should not be unsatisfactory.

Frontino Maintains Dividend

Due to the higher profit which could be made in Colombia while the bonus on gold production of 30 pesos per oz. was in effect, it was considered justifiable to mill a lower grade of ore at Frontino Gold Mines during the year to December 31, 1953. A difficulty was, however, encountered during the year in that due to technical difficulties there was a fall in the percentage of gold recovered at the plant which resulted in the yield being even lower than planned. This situation has, however, since been corrected.

Year to Dec. 31	Tons Milled	Heads Value*	Ounces Produced	Development	Ore Reserves
		(dwt/ton)	Gold Silver	(ft.)	Tons Av. dwt.
1953	116,274	10.1	55,465 48,975	15,602	181,070 17.5
1952	117,323	11.3	62,121 56,264	14,561	186,804 15.7

* Also: Silver 17.6 dwt. per ton (1952—21.8 dwt.) Lead .76 per cent (1952—.95 per cent)

Note—In addition 667 tons of concentrates, estimated to contain 488 oz. of gold and 30,694 oz. silver and 334 tons of lead were recovered.

Despite the small loss made on the year's operation, dividends amounting to 2s. 6d. per £1 stock unit, or 12½ per cent, were again paid on the company's issued ordinary capital of £190,573.

Year to Dec. 31	Total Revenue	Ex-penses*	Taxation	Net Profit	Dividends	To Reserve	Carry Forward
	£	£	£	£	£	£	£
1953	822,313	792,210	32,557	£2,454†	£13,418	Nil	£42,039
1952	913,436	875,756	29,819	7,861	13,232	20,000	53,386

* Expenditure in Colombia £716,198 (1952—£779,272)

† Before credit of £4,525 in respect of an excess provision of U.K. taxation

Much progress is being made with the active development programme at the Silencio Mine which has continued during the year with encouraging results. However, although no large new ore body has been found, in the 280 north winze area of the Manto Vein, enough ore has been encountered to justify this project. Plans for the current year at this mine include a considerable amount of work in deepening below Level 30, hoisting preparations from below Level 29, and the continuation of ore searching operations.

Results in respect of the first five months of the current financial year are encouraging and show that a total of 50,400 tons have been milled last year for a recovery of 28,915 oz. compared with 23,192 oz. in the corresponding period of the last financial year.

Meeting, London, July 10, the Rt. Hon. Lord Rathcaven is chairman.

Tanjong Tin's Lower Profits

As to some extent foreshadowed in last year's report and accounts of Tanjong Tin Dredging, there was a considerable decrease in the recovery of tin-ore during the year to December 31, 1953. This was due mainly to the nature of the ground worked by the company's No. 2 Dredge which necessitated the treatment of tailings left from war-time operations by the Japanese. In addition, a large portion of this area had already been dredged to a depth of about 60 ft. by No. 1 Dredge. Nevertheless, the company's present difficulties are of a temporary nature for ground of good value lies below the 60 ft. level.

Year to Dec. 31	Area dredged (acres)	Ground treated (cu. yd.)	Tin-ore recovered Tons	Grade (lb. per cu. yd.)	Working cost per cu. yd.	Price rec'd per ton
1953	54.14	4,552	780	.39	9d.	428
1952	44.68	4,206	981	.52	10½d.	590

Due to the year's operating difficulties and also to the sharp fall in tin prices the total revenue earned by the company was substantially decreased from the previous year's figure. Consequently, dividends paid on the issued capital of £185,834 in shares of 5s. were reduced from a previous total of 80 per cent to 47½ per cent.

Year to Dec. 31	Total Revenue Sales of Tin ore*	Other Revenue	Net Profit†	Dividend	To Reserve	Carry Forward
	£	£	£	£	£	£
1953	322,923	13,085	39,838	47,852	nil	46,707
1952	577,746	13,650	114,994	78,050	25,000	54,821

* Less duty, charges, tribute, etc.

† After expenses of which those for mining were £169,681 (1952—£184,515)

As it is not anticipated that No. 2 Dredge will pass out of its present area until the end of the year, and as No. 1 Dredge will be treating lower grade ground, a somewhat lower level of production must be expected during the current year. Moreover, as Mr. A. G. Glenister, chairman of the company, says, there are uncertain times ahead and although the company is well placed to meet them, a lower standard of profits and dividends should be anticipated. However, five months' production figures reveal that a total of nearly 292 tons of tin-ore have been recovered which is in advance of the total for the corresponding period of the previous year of 284 tons. Meeting, July 15, London.

Kinta's Increased Production

Details of Kinta Tin Mine's operating results during the year to December 31, 1953, show that a greater volume of ground treated, together with a rise in the grade of ore recovered, was responsible for an increased output of tin ore.

Year to Dec. 31	Volume of ground treated (cu. yd.)	Tin-ore recovered Per cu. yd. (lb.)	Tons	Working cost per cu. yd.	Price recd. per ton ore
1953	1,140	.67	339	16d.	407
1952	1,106	.61	304	15d.	572

Although this increase in production did much to offset the considerable drop in tin prices it could not, however, prevent the decline in revenue which took place. Dividends on the company's issued capital of £120,000 in 5s. shares were there-

fore reduced from the previous level of 40 per cent to 32½ per cent.

Year to Dec. 31	Sales of Tin-ore*	Other Revenue	Taxation	Net Profit**	Dividend	Carry Forward
	£	£	£	£	£	£
1953	138,703	22,207	43,145	15,301	21,150	18,877
1952	174,771	37,184	70,901	29,137	25,200	24,726

* Less duty and charges

** After expenses of which those for mining were £76,190 (1952—£68,952)

Against a background of the impending ratification of the International Tin Agreement, Mr. A. G. Glenister, the chairman, warned shareholders (as in the case of Tanjong Tin Dredging) that despite the company's strong financial and technical position they would be well advised, in view of the possibility of restriction of output, to anticipate profits and dividends on a lower scale than in recent years. Nevertheless, output figures for the first five months of the current financial year show that 120 tons of tin-ore have been produced compared with 116 tons for the corresponding period of the previous year. Moreover, it is thought that output should be able to be maintained, for although lower returns are to be expected from the company's Lallang section, a new paddock which is being developed at the Damak section will do much to offset this and is no doubt now contributing substantially to production. Meeting, July 15, London.

Company Shorts

Johnson Matthey Dividend Up and Scrip Issue.—In a preliminary statement from Johnson Matthey and Co. it is announced that despite a decline in group net profit after tax from £638,825 to £556,011 earned during the year to March 31, 1954, it has been decided to recommend an increase in the final dividend to 18 per cent as compared with 12 per cent for the previous year. This brings the company's total distribution on its ordinary issued capital of £1,329,145 to a total of 21 per cent as compared with 15 per cent for the preceding period and absorbs a total of £153,516 net against last year's figure of £99,267 net. It is also intended to make a 200 per cent scrip issue of ordinary shares which, however, will not rank for distribution in respect of the year to March 31, 1954. It is, however, stated as an indication of future dividend policy that had the ordinary share capital already been trebled a total distribution of 7 per cent would have been recommended for the year.

Bid For Tinto's Spanish Interests.—Although no agreement has yet been reached it is officially announced that discussions are in progress between Rio Tinto and unnamed Spanish interests with a view to the latter acquiring a majority shareholding in the company's Spanish mines. It is stated that an announcement will be made as soon as the company is in a position to do so.

Dominion Reefs to Emigrate?—It has been announced this week by Dominion Reefs (Klerksdorp) Ltd. that their application has been made to the Treasury for permission to transfer the company's residence from the U.K. to the Union of South Africa. Readers will recall that earlier this year the control of this company was acquired by the New Union Goldfields group in association with Dr. Braun.

Drilling at Gt. Western Consolidated.—It is announced that the F.S.6 inclined drill hole at Fraser's mine, Southern Cross, has cut quartz vein material between 448 and 556 ft. and between 485 and 488 ft. But assays were low except from 453 to 454 ft. where high values assaying 600 dwt. over 12 in. were obtained. These high values occur in quartz vein about 2 ft. wide which is believed to be in the footwall of main Fraser's lode. The significance of this result, however, will not be known until further drilling is done.

National Mining Re-Enters Dividend List.—In a preliminary statement by the National Mining Corporation profits for the year ended March 31, 1954, are shown to have risen to a total of £49,301 against £15,231 previously.

This figure, however, includes a total of £11,075 in respect of profit from sales of fixed assets in Trinidad. After the transfer of £10,000 to general reserve a dividend of 10 per cent or 3d. per share was recommended on the company's new issued ordinary capital of £340,307 in stock units of 2s. 6d. each leaving a credit balance of £17,742 to be carried forward against an adverse balance of £1,146,687 at the end of 1952 and subsequently written off under the company's reorganization scheme. Meeting, London, July 29. Major General W. W. Richards is chairman.

Further Capital Repayment by Rose Deep.—It is reported that following the initial capital reduction of 1s. per share made

by Rose Deep in 1953, permission has now been confirmed by the Supreme Court of the Union of South Africa for the return of a further 2s. per share. After this operation has been completed the company's issued capital will be £595,000 in 700,000 shares of 17s. each. The repayment, which becomes due on July 1 in S.A. currency, will be made to holders registered on June 30, 1954.

Premier Consols Adds 5 Per Cent Bonus to Dividend.—The profits for the year March 31, 1954, earned by Premier Consolidated Oilfields showed an increase to £64,666 from a previous total of £55,759. After a sharply increased taxation liability of £30,000, however (against £17,500 previously), a dividend of 15 per cent plus a bonus of 5 per cent, making a total of 20 per cent for the year, was paid on the company's issued capital of £339,209 in units of 1s. each. This compares with 15 per cent paid in respect of the preceding year. No appropriation was made to general reserve against £12,500 last year and the decreased amount of £48,206 was carried forward against £50,853 previously. Meeting, July 28. Mr. P. A. Ashmead-Bartlett is chairman.

Transvaal and O.F.S. Chamber of Mines.—At the annual meeting held in Johannesburg this week, Mr. C. B. Anderson was elected president for the coming year with Messrs. K. Richardson, and B. L. Bernstein as vice-presidents.

Mr. A. Hedley Williams has resigned from the Board of Amalgamated Banket Areas Ltd.

Teleprinter Facilities.—Johnson Matthey and Co. Ltd., and the Anglo Chemical and Ore Co. Ltd., both announce that they are now connected with the International Telex system, which provides direct foreign teleprinter communication, later to be extended to include transmissions within the United Kingdom. **Johnson Matthey's** number is London 8702. **The Anglo Chemical and Ore's** number is London 2600 and this company's "Answer Back" code is CHEMORE, LONDON.

The Hunting Group of Companies now have their headquarters at Norwich House, 4 Dunraven Street, Park Lane, W.1. Telephone Hyde Park 9781.

Obituary

EDWARD AMOS LORING

We regret to learn of the death at his London residence on Friday of last week of Mr. Edward Loring, partner in the firm of Bewick, Moreing and Company, the well known consulting mining engineers. Mr. Loring, who died at the comparatively early age of 63 was the son of that leading Californian mining engineer, Mr. W. J. Loring, who was for many years the late Mr. Moreing's American partner. Mr. Edward Loring came to this country many years ago since when he became a partner in the firm of Bewick, Moreing and Company and was particularly identified with Cardox (Great Britain) Ltd. of which he became managing director. He was also a director of Sons of Gwalia Ltd., Klerksdorp Consolidated Goldfields Ltd., and Central European Mines Ltd.

HER MAJESTY'S COLONIAL SERVICE

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May Mine Returns

SOUTHERN RHODESIAN GOLD

Company	May, 1954			Months since year end	Current Financial Year Total to date			Last Financial Year Total to date		
	Tons (000)	Yield (oz.)	Profit (£000)		Tons (000)	Yield (oz.)	Profit (£000)	Tons (000)	Yield (oz.)	Profit (£000)
Arcturus	3.0	—	3.3	11	33.8	—	34.4	34.1	—	34.9
Cam & Motor	24.0	7,882	45.4	11	266.7	83,911	497.1	260.5	69,087	440.8
Connaught	0.8	—	1.9	11	8.8	—	16.1	8.1	—	18.4
Falcon Mines	17.1	2,866	8.1	8	134.3	21,847	55.7	118.6	17,818	35.9
Globe & Phoenix	6.2	3,605	23.0	5	30.4	17,907	116.5	30.0	16,657	104.5
Motape Gold*	18.5	2,493	2.9	5	91.4	12,500	17.7	111.6	12,337	5.8
Muriel Mine	2.9	—	10.2	11	25.8	—	87.4	10.6	—	82.2
Rezende	6.6	1,146	0.2	5	33.3	5,978	0.9	33.0	6,020	12.0
Tebekwe	7.8	—	2.3	11	89.0	—	26.6	86.6	—	35.9

* Excluding premium gold sales

AUSTRALIAN GOLD

Company	4 weeks to May 18		4 weekly period since year-end	Current Financial Year Total to date		Last Financial Year Total to date	
	Tons (000)	Yield (oz.)		Tons (000)	Yield (oz.)	Tons (000)	Yield (oz.)
Boulder Perseverance ..	10.3	2,568	2	19.9	4,808	18.5	4,395
Central Norseman	12.1	6,063	2	23.9	12,225	25.6	12,022
Central Victoria*	239.2	680	2	420.4	1,408	377.5	1,176
Golden Horse Shoe	78.7	724	5	376.3	4,766	382.2	3,871
G.M.'s of Kalgoorlie ..	15.9	4,843	2	29.5	8,193	28.8	7,245
Kalgoorlie Enterprise ..	5.7	1,615	2	10.9	3,099	8.4	2,695
Morning Star	1.3	1,055	2	2.7	2,481	2.7	3,193
New Coolgardie	4.8	2,217	2	9.1	4,653	10.4	5,120
North Kalgurl	18.8	4,467	5	94.7	22,414	106.6	24,167
Sons of Gwalia	8.3	2,057	5	38.5	8,095	43.7	10,310
South Kalgurl	7.8	1,498	2	15.3	3,157	17.7	3,388

* Cu. yds. dredged

INDIAN GOLD

Company	May, 1954		Months since year end	Current Financial Year Total to date		Last Financial Year Total to date	
	Tons (000)	Yield (oz.)		Tons (000)	Yield (oz.)	Tons (000)	Yield (oz.)
Champion Reef	15	4,830	5	73	27,952	52	20,781
Mysore	19	6,645	5	87	33,677	79	30,126
Nundydroog*	22	5,737	5	105	29,551	105	28,912
Ooregum†	—	111	5	—	647	49	13,063

* Includes tailings

† Yield from clean up only

MISCELLANEOUS GOLD

Company	May, 1954		Months since year end	Current Financial Year Total to date		Last Financial Year Total to date	
	Tons (000)	Yield (oz.)		Tons (000)	Yield (oz.)	Tons (000)	Yield (oz.)
Br. Gu. Consol.*	245.3	2,128	5	946.0	9,177	928.2	4,946
Clutha River*†	237.0	298	2	459.0	631	358.0	808
Frontino	10.6	5,362	5	50.4	28,915	47.6	23,192
Kentan (Geita)	21.5	3,335	11	234.0	35,520	222.1	32,408
Saudi Arabian§	3.6	£23,001	4	24.5	£199,835	36.1	£54,001
St. John d'El Rey‡	23.8	£104,000	5	129.9	£583,940	141.1	£930,276

* Cu. yds. dredged

‡ Estimated realizable value

† 4-weekly period since year end

§ April figures

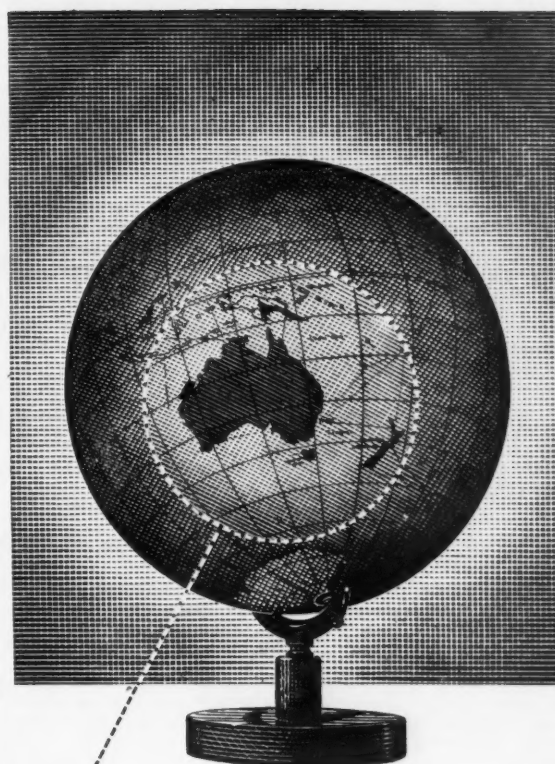
COAL

Company	May (in tons)	Months Since Year End	Cumulative Totals (in tons)	
			This year to date	Last year to date
Amal. Coll. of S.A.	577,001	5	2,841,134	3,088,565
Apex	79,140	5	393,500	412,398
Blesbok	45,302	5	226,917	256,980
Coronation	80,210	5	435,828	470,982
Dundee	31,490	5	165,772	182,271
Natal Navigation	100,829	11	1,187,890	1,269,262
New Clydesdale	70,097	11	786,096	492,986
New Largo	85,742	5	368,652	197,331
S.A. Coal Est.	136,864	11	1,500,359	1,527,522
Springbok	68,299	5	342,695	378,140
Transvaal & Delagoa† ..	106,165	9	1,074,766	—
Van Dyks Drift	45,832	5	243,905	250,571
Vierfontein‡	76,664	5	347,768	23,728
Vryheid Cor.	42,418	5	206,659	207,799
Vryheid Cor.*	37,609	5	173,966	183,359
Wankie Coll.	198,208	9	1,797,596	1,796,431
Wankie Coll.*	13,264	9	104,779	108,616
Witbank	102,937	5	656,956	632,496

* Coke

† Commenced production in September 1953

‡ Commenced production in May 1953



What about here?

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UNION MINIÈRE DU HAUT-KATANGA

The annual general meeting of the Union Minière du Haut-Katanga was held in Brussels on June 24.

Mr. Gaston Blaise was in the chair.

The accounts for the year ended December, 1953, were adopted.

The Profit and Loss Account showed a gross profit of Fr.4,698,363,460. After deduction of the provisions for depreciation and for profit taxation and of sundry charges, there remained a net profit of Fr.3,128,626,070. By inclusion of Fr.45,030,433 brought forward from the previous year, the available balance totalled Fr.3,173,656,503.

From this balance, Fr.795,446,268 were appropriated to the reserve and the special reserve and contingencies funds, and Fr.94,253,355 were carried forward. The balance left for distribution amounted to Fr.2,283,956,880.

The Meeting approved a dividend of Fr.1,450 net per share for the year 1953. Taking into account the interim dividend of Fr.600 paid in January, 1954, the final dividend is accordingly Fr.850 net per share.

MR. E. SENGIER'S STATEMENT

In his address to the meeting, **Mr. E. Sengier**, Chairman of the Permanent Committee, said:

"The important programme for capital and modernization of our plants materializes according to our plans. You will certainly find satisfactory the technical and financial results outlined in our report to the General Meeting of this day. These results have been obtained thanks to the competent and devoted co-operation of our staff to which I pay tribute. Our productions of copper (214,000 metric tons) and cobalt (8,300 metric tons)—our two main activities—have, for the financial year under review, increased again in comparison with those of 1952. The tonnages sold and delivered during the financial year are slightly lower than the tonnages produced.

"On the other hand, the average selling price of our copper deliveries, which has an effect on the results of the financial year, is practically the same as that of 1952—that is, about 34,700 francs per metric ton, a price which corresponds to a 30.50 cents f.a.s. New York quotation.

"These results and the increase of our liquid assets, notwithstanding the heavy capital expenditure, justify our proposal to raise last year's dividend of 1,250 francs to 1,450 francs for this year.

"As in the preceding years, I am giving you some main elements of this year's accounts, that is, in rounded figures:—

(In francs millions)

Net dividend	1,800
Taxes and duties	2,270
Royalty to the Comité Spécial du Katanga ...	210
Amortization	800
Total capital expenditure	1,500
Amount assigned to reserves	750
Increase of assets	560

Concerning the prospects for 1954 and the coming years, **Mr. Sengier** stated:—

"I wish to avoid (in a period when the industrial copper statistics are influenced by variable purchases for armaments and governments' stockpiling) making long-term forecasts as to the market and to quotations. The latter seem for the time being stabilized at the rate of 29 to 30 cents, which is close to the price obtained during the financial years 1952 and 1953. The sales which had fallen during the first two months of the year, have greatly increased during the last four months, with the consequence that, at this day, the sales already concluded this year, and which will affect the 1954 results, amount to 130,000 metric tons.

"These results are very satisfactory and enable us to face the 1954 balance-sheet with confidence."

POINTS FROM THE DIRECTORS' REPORT

Further to the above statement, the report of the Board of Directors, which has been circulated with the accounts, shows that, in 1953 again, the previous years' high productions were exceeded.

Besides copper and cobalt, other productions include 242,000 metric tons of zinc concentrates, 32 tons of cadmium, 154,000 kilos of silver and 61 kilos of gold.

The exportation of uranium-radium concentrates has been carried on, the radium being recovered to meet the consumers' demands.

The Société Générale Métallurgique de Hoboken has been entrusted with the study of making electronically pure germanium dioxide from germaniferous dusts produced by the Company. The process will soon be started on an industrial scale.

In 1953, the Company carried on its development and modernization programme. The capacity of both Kipushi and Kolwezi concentrators has been increased respectively to 85,000 and 200,000 tons of ore per month.

At the Lubumbashi plant, a second casting-furnace has been put into operation early in 1954.

At the Jadotville plant, additional equipment has been put into service. The total annual capacity of the plant has thus been brought up to 110,000 metric tons of copper and 4,400 tons of cobalt.

The construction of the Delcommune power-station is drawing to a close; the second turbo-alternator group was started up in May, 1953, and the third one last March. The reserve group is in course of erection.

The workings of the Le Marinel power-station have been intensified. According to plans, the first group is due for service in January, 1957.

A 220 kV line, which will connect the Le Marinel power-station to the Jadotville metallurgical centre, is in course of erection. This line will be extended to the copper mines of Northern Rhodesia and create an interconnection between the system of Upper Katanga and of the Rhodesian copperbelt.

A contract for supplying annually 500 million kWh during ten years to Northern Rhodesia has been concluded.

The health situation of the Congolese workers is still improving owing to the constant care taken by the medical and by the labour services.

On the other hand, the Company has carried on the education and instruction of youth. A new vocational school has been opened at Ruwe to provide the necessary instruction and training to the children of the Company's workers.

KILLINGHALL TIN

HEAVY TOLL OF EXPORT DUTY

The twenty-fourth annual general meeting of Killinghall Tin, Ltd., was held at the Registered Office of the Company, 1-4 Great Tower Street, London, E.C.3, on Friday, June 25.

The following is from the circulated statement of the Chairman, **Mr. Jack Addinsell**:

The second half of the financial year under review produced only a small output of tin ore. During that period the dredge was altering course and was working in low grade ground.

The year's working showed a profit at the mine of £11,051, but before arriving at this figure tin export duty paid to the Malayan Government amounted to no less than £27,582. After bringing in interest and sundry receipts, charging head office expenses and writing off depreciation amounting to £6,270 and a proportion of rehabilitation and reconstruction expenditure amounting to £6,450, a small loss of £67 resulted. Stockholders will appreciate that no dividend would normally be justified; we have, however, brought into the accounts a taxation adjustment in respect of Excess Profits Levy recoverable of £18,000. We are recommending, therefore, a dividend of 10 per cent which will require net £8,250, and leave us with £21,649 to carry forward to the current financial year.

We now know that we shall only receive approximately 90 per cent of the War Damage Claim, as provisionally assessed. The remaining 10 per cent has therefore been added to the Rehabilitation and Reconstruction expenditure, which is being properly amortized.

In the first month of the new financial year the dredge was turned to the south and there was immediate improvement in values and conditions. The ground ahead is variable, but for seven months of the current year the output of tin ore has totalled 354½ tons.

Stockholders will be pleased to read the General Managers' report on the security position during the year under review although conditions under which work is conducted remain extremely onerous.

The report and accounts were adopted.

SIAMESE TIN SYNDICATE, LTD.

The Forty-seventh Annual General Meeting of the Siamese Tin Syndicate, Limited, was held at Winchester House, E.C.2, on Tuesday last.

Mr. Kenneth O. Hunter, Chairman, presided.

The following is an extract from the Chairman's Statement issued with the report and accounts for the year ended December 31, 1953:

The total output of the parent Company and the Malayan Subsidiary at 8,380,600 cu. yds. is slightly less than in 1952, but the total production of 1,889 tons is 28 tons greater and is the highest since dredging restarted in 1947. During the last three months of the year, Bangrin in addition contributed 696,500 cu. yds. and 210 tons of tin ore.

The average price obtained for our tin ore in 1953 was £538 per ton, a fall of £137 during the year. The overall production cost was reduced from £366 to £343 per ton of tin ore. The average mine cost has fallen from 20.1 to 19.7 pence per cu. yd.

The consolidated net profit for the year, before taxation, amounts to £343,963 which, despite the inclusion of £25,742 in respect of the Bangrin Company's profits from October to December inclusive, shows a pronounced decrease in comparison with last year's figure of £525,814. The existence of certain contracts in respect of about a third of the total output, which did not expire until the end of the year, prevented this fall in profits from being as severe as would otherwise have been the case.

Siam. Last year, I referred to the concern that was felt over the security of tenure of our mining leases. I am now glad to report that a number of the mining leases of immediate importance have already been re-issued to us and we understand that the remainder of our outstanding lease applications will be dealt with in 1954.

Another property, Bangnon, adjacent to Renong township and some ten miles from Ngow, has been examined and bored under an option which was taken up on January 2, 1954. Of the two sections over which we have applied for mining leases, one is estimated, on our check boring, to contain 24,500,000 cu. yds., averaging 0.57 lb. per cu. yd. The other, close by, is reputed to contain 8 million cu. yds. more or less, averaging approximately 0.45 lb. per cu. yd. Boring is taking place over parts of a third area adjoining the first, in which some surface rights remain to be settled. Since the end of the year we have also acquired, for the sum of £3,000, a property of 541 acres. Of this total, 102 acres previously bored by us and estimated to contain 7,943,000 cu. yds., averaging 0.44 lb. per cu. yd., is contiguous to the working Bangrin leases.

Malaya. On reboring Chemor, 3,976,000 cu. yds., averaging 0.51 lb. per cu. yd., were found to be payable and have been returned to reserves. This quantity is too small to warrant the installation of a dredge, and the property is being let on tribute to a gravel pumping firm.

Bangrin No. 2 Dredge remains dismantled and partly under cover at Kota Bahrui and at Chemor.

The total reserves of the group at December 31, 1953, are estimated to amount to some 153,000,000 cu. yds., averaging 0.51 lb. per cu. yd. This figure does not include the Bangnon property, which will be added on the issue of the relevant mining leases; nor 12,500,000 cu. yds. of marginal tailings re-bored at Ngow.

The Rio Tinto Company with its 51 per cent interest had full managerial responsibility throughout 1953 for the Lead-hills enterprise, which was named "Lowland Lead Mines." During the year, the Glencrieff Drainage Adit and the collar of the Glencrieff Shaft were recovered and made secure, and hoisting and pumping equipment was installed. Unwatering had reached the 8th or 160 fathom Level by January 17, 1954. Some miles of tunnel have now been made safe, particularly on the Adit, 4th and 8th Levels. Exploration and sampling is being carried out with a view to arriving at a decision in a few months regarding the option, which expires on September 30, 1954. The values encountered so far conform reasonably with those recorded by the late Manager, but the tonnage which could readily be made available for mining may be smaller than originally hoped. An electro-magnetic geophysical survey is being carried out on the surface in order to locate hidden outcrops. Some anomalies have been found and are being tested.

The total cost up to the end of 1953 to our companies has been £83,996.

By an enactment of September 9, 1953, power was given to the Siamese Minister of the Interior to vary royalties and these were reduced by 50 per cent on September 16.

The report and accounts were adopted.

TEKKA-TAIPING, LTD.

MR. DONALD W. THOMAS'S STATEMENT

The Thirty-fourth Ordinary General Meeting of Tekka-Taiping, Limited, was held on June 28, 1954, at the Registered Office, Redruth.

Mr. Donald W. Thomas, Chairman, presided.

The Reports and Accounts for the year ended October 31, 1953, having been circulated for the prescribed time, were taken as read, as was also the Chairman's Statement, circulated with the Reports and Accounts, which was as follows:—

Before I review the accompanying accounts I should first like to refer to the "Supplementary Remarks" which I made at the last Annual General Meeting and which were appended to the Chairman's Statement.

It will be recollected that during the preceding months the dredge had been operating in low grade tailings from which recoveries had proved most disappointing.

At that time, with the prospect of difficult dredging conditions ahead and with the recession in the price of tin, the General Managers advised that indications then were that the dredge would be unlikely to work profitably. Your Directors considered that the Shareholders should be clearly informed of the immediate outlook and also of my intention to visit Malaya and to take the opportunity of inspecting the property.

I examined the position with the General Managers on the spot, and the outlook then was that although a limited area containing better bore values lay immediately ahead of the dredge these values were covered by a bank of old tailings of a height such as to make efficient recovery of the tin ore in depth extremely doubtful. I am happy to say that by skilful systematic manœuvring of the dredge it was found possible successfully to deal with the problem and, moreover, in contrast with the previous disappointing recoveries, results considerably exceeded expectations.

CURRENT YEAR'S OUTPUT

During the first five months of the current financial year the output of tin ore was 235 tons as compared with 89½ tons produced in the corresponding period of 1952/53 and there was also a welcome increase in the tin price. Shareholders were advised in April last that the dredge would shortly pass into ground which, according to the bores, is of lower grade and it is therefore not to be expected that this standard of output will be maintained.

Now, to turn to the accounts for the financial year ending October 31, 1953, there was a profit of £15,054 after payment to the Malayan Government of £20,854 for royalty on ore sales and provision for United Kingdom and Malayan taxation amounting to £16,471.

One dividend of 6d. per share was paid on February 9 last absorbing a net amount of £5,500 and the sum of £10,000 has been written off Capital Expenditure. The Profit and Loss Account balance brought in was £35,012 and the balance unappropriated at October 31, 1953, is £34,566 which the Directors propose to carry forward to the ensuing year.

From the statistics contained in the General Managers' Report, which is attached, it will be seen that there was an increase in both yardage and output, offset by the lower grade of the ground treated and a large reduction in the price received for tin ore as compared with the previous year.

It is satisfactory to note that under the heading of "Security" the General Managers report that, in accordance with Government policy, the number of resident Special Constables was reduced and that there were no incidents at the property.

On behalf of the Shareholders I thank Messrs. Osborne and Chappel, our General Managers, the Staff at the Mine, and the labour force for the excellent services they have continued to render to the Company.

The Statement of Accounts and Balance Sheet, together with the Directors' Report, were received and adopted.

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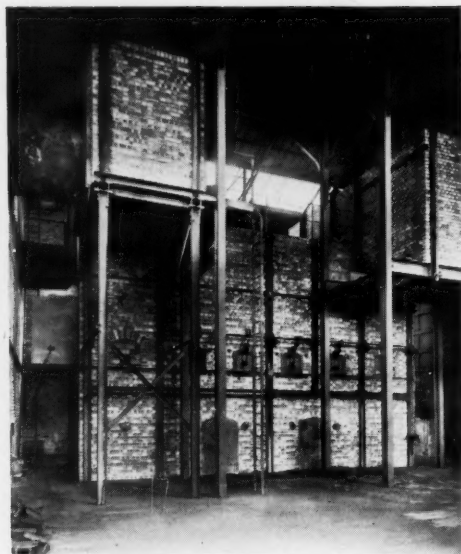
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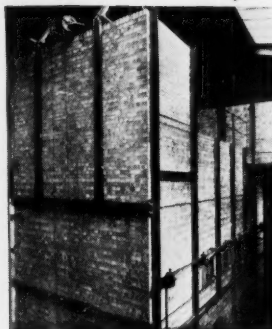
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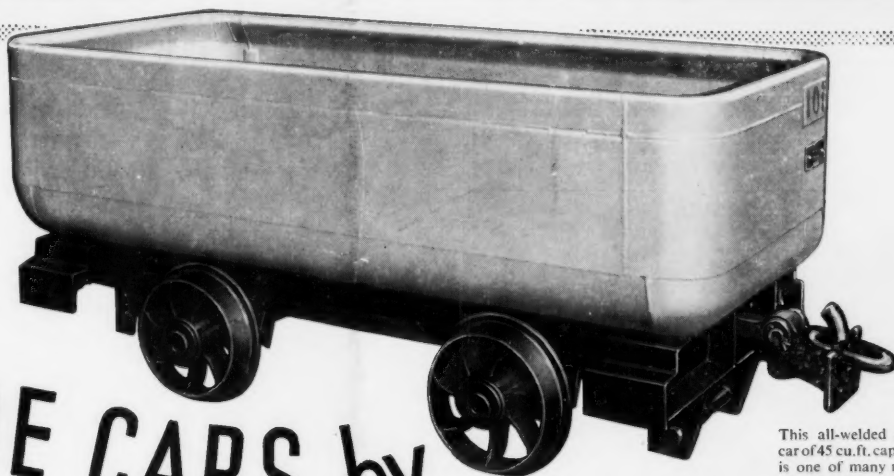
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